This document provides pertinent information concerning the reissuance of the VPDES Permit listed below. This permit is being processed as a **Major, Municipal** permit. The discharge results from the operation of a 4.5 MGD wastewater treatment plant. This permit action consists of updating the proposed effluent limits to reflect the current Virginia WQS, effective January 6, 2011, and updating permit language as applicable. The effluent limitations and special conditions contained in this permit will maintain the Water Quality Standards of 9VAC25-260 et seq.

1. Facility Name and Mailing Address:	Fredericksburg WWTF P.O. Box 7447 Fredericksburg, VA 22404-7447	SIC Code:	4952
Facility Location:	700 Beulah Salisbury Road Fredericksburg, VA 22401	County:	City of Fredericksburg
Facility Contact Name:	Doug Fawcett, Director of Public Works	Telephone Number:	540-372-1023
2. Permit No.:	VA0025127	Expiration Date:	10/17/2012
Other VPDES Permits:	VAR051809—Storm Water Industrial General Permit VAN020095—Nutrient Discharge General Permit		
Other Permits:	Air Registration No. 41080		
E2/E3/E4 Status:	NA		
3. Owner Name:	City of Fredericksburg		
Owner Contact/Title:	George Robinson, Interim Wastewater Superintendent	Telephone Number:	540-372-1077
4. Application Complete Date:	5/09/2012		
Permit Drafted By:	Anna Westernik	Date Drafted:	10/15/2012
Draft Permit Reviewed By:	Alison Thompson	Date Reviewed:	10/24/2012
WPM Review By:	Bryant Thomas	Date Reviewed:	10/31/2012
Public Comment Period :	Start Date: 1/25/2013	End Date:	2/25/2013
5. Receiving Waters Information:	See **Attachment 1** for the Flow Frequency Determination.		
Receiving Stream Name:	Rappahannock River	Stream Code:	3-RPP
Drainage Area at Outfall:	1632.46 square miles	River Mile:	107.99
Stream Basin:	Rappahannock River	Subbasin:	None
Section:	1	Stream Class:	II
Special Standards:	a	Waterbody ID:	VAN-E20E
7Q10 Low Flow:	Tidal	7Q10 High Flow:	Tidal
1Q10 Low Flow:	Tidal	1Q10 High Flow:	Tidal
30Q10 Low Flow:	Tidal	30Q10 High Flow:	Tidal
Harmonic Mean Flow:	Tidal	30Q5 Flow:	Tidal
303(d) Listed:	Yes (*E. coli*; PCBs)		
TMDL Approved:	Yes (*E. coli*)	Date TMDL Approved:	5/5/2008

6. Statutory or Regulatory Basis for Special Conditions and Effluent Limitations:

✓	State Water Control Law	✓	EPA Guidelines
✓	Clean Water Act	✓	Water Quality Standards
✓	VPDES Permit Regulation		Other:
✓	EPA NPDES Regulation		GP

7. **Licensed Operator Requirements:** Class 1

8. **Reliability Class:** Class 1

9. **Permit Characterization:**

___	Private	___	Effluent Limited	___	Possible Interstate Effect
___	Federal	✓	Water Quality Limited	___	Compliance Schedule Required
___	State	✓	Toxics Monitoring Program Required	___	Interim Limits in Permit
✓	POTW	✓	Pretreatment Program Required	___	Interim Limits in Other Document
✓	TMDL				

10. **Wastewater Sources and Treatment Description:**

Sewage from the City of Fredericksburg collection system enters the headworks of the Fredericksburg WWTF for treatment or is diverted to the FMC WWTF. Diversion of approximately 1.5 MGD of the current average flow of 3.0 MGD of sewage to the FMC WWTF occurs from 8:30 p.m. to 12:00 a.m. daily.

Primary treatment consists of bar screens (two mechanical and one manual) and a Cyclone grit collection system. After primary treatment, the effluent is sent to the 3-ring oxidation ditch for secondary treatment via the influent lift station. Influent sampling is conducted prior to the lift station. In the past, two primary clarifiers were used to separate solids before secondary treatment. These are no longer on line—they are only used to hold excess flow during high rain events.

Each of the three channels in the oxidation ditch can be maintained at different dissolved oxygen levels. Each channel is operated so that the oxidation ditch functions in an extended aeration mode. In Channel No.1 (outside channel) most of the oxidation of BOD and ammonia, oxygen uptake, and denitrification occurs. In Channel No. 2 (middle channel) dissolved oxygen will vary due to varying loads that enter the plant. Channel No. 2 augments the work of Channel No. 1. Channel No. 3 (inside channel) is maintained at a high dissolved oxygen level so that the mixed liquor delivered to the clarifiers has a high residual oxygen. The recommended dissolved oxygen level in the O&M Manual for each channel is as follows:

Channel No.1	0.0 mg/L D.O
Channel No. 2	1.0 mg/L D.O
Channel No. 3	2.0 mg/L D.O

When treating flows well below the plant average design flows of 4.5 MGD, the oxidation ditch can be operated with only Channel No.2 and Channel No. 3 on line. The recommended dissolved oxygen level in the O&M Manual for each channel when operating in this mode is as follows:

Channel No. 2 - 0.5 mg/L D.O.
Channel No. 3 - 2.0 mg/l D.O.

During periods of high flow, Channel No. 1 or Channel No. 2 can be isolated to prevent mixed liquor suspended solids from washing out of the respective channel.

This facility has the capability to add alum, polymer, and caustic soda to the oxidation ditch but currently does not do so. Caustic soda increases the pH and maintains alkalinity and thus, maintains the vitality of the microorganisms in the oxidation ditch and increases the efficiency of coagulation agents. Polymer improves settling in the clarifiers without disturbing the flocculation process. Alum may be used to precipitate phosphorus out of solution.

Effluent exiting the oxidation ditch is routed to two secondary clarifiers operating in parallel. Return activated sludge (RAS) is routed from the secondary clarifiers to the oxidation ditch. Waste activated sludge (WAS) is sent to two WAS holding tanks. The sludge from the holding tanks is then thickened, dewatered, and stored under cover on site to be transported for land application. The sludge thickening, dewatering, and land application is operated by Synagro.

The clarified effluent is treated using Trojan ultraviolet (UV) disinfection prior to discharge. The UV disinfection system is compromised of the following major components: four UV Banks, four Power Distribution Centers (PDC), four UV Modules/bank, eight UV lamps/module, one System Control Center (SCC), and one Hydraulic System Center (HSC).

Sampling is conducted after disinfection and before the cascade aerator – the final treatment process. Effluent flow is measured by an ultrasonic level sensor located at a plant effluent V-notch weir located between the effluent well and the cascade aerator. Discharge is directly to the Rappahannock River.

See **Attachment 2** for a facility schematic/diagram.

TABLE 1
OUTFALL DESCRIPTION

Number	Discharge Sources	Treatment	Design Flow	Latitude / Longitude
001	Primarily Domestic Wastewater with Some Industrial Wastewater	See Item 10 above.	4.5 MGD	38° 17' 18" N 77° 26' 57" W
See **Attachment 3** for the Fredericksburg Quadrangle Map Topographic Map (182C) showing Outfall 001 of the Fredericksburg WWTF and other discharges in the vicinity of the outfall.				

11. Sludge Treatment and Disposal Methods:
Waste activated sludge (WAS) is sent to two WAS holding tanks. The sludge from the holding tanks is then thickened, dewatered, and stored under cover on site to be transported for land application. Sludge is stabilized to a Class B level of pathogen reduction by raising the pH to 12 and retaining it at 11.5 using lime stabilization. The sludge thickening, dewatering, and land application is operated by Synagro. Synagro's applicable sludge application permit numbers are VDHBUR 99, VDHBUR 77, VDHBUR 58, VPA00062, VDHBUR24A, VPA01578, VDHBUR 42, VDHBUR 43.

12. Discharges, Intakes, Monitoring Stations and Other Items Affecting the Discharge or Within Waterbody VAN-E20E:

TABLE 2
RAPPAHANNOCK RIVER DISCHARGES, INTAKES, AND MONITORING STATIONS

Approximate Rappahannock River Mile	Description
113.57	USGS Gaging Station (Fredericksburg)
110.57	DEQ Sampling Station 3-RPP110.57
107.99	Discharge – City of Fredericksburg WWTF, VPDES VA0025127, Major-Municipal
107.91	DEQ Sampling Station 3-RPP107.91
107.43	Discharge – FMC WWTP, VPDES VA0068110, Major-Municipal
107.49	Tributary with Discharge – Deep Run, Quarles Petroleum – Fredericksburg Bulk Oil Terminal, VPDES VA0029785, Minor-Industrial
107.33	DEQ Sampling Station 3-RPP107.33
106.01	DEQ Sampling Station 3-RPP106.01
104.53	Discharge – Massaponax STP, VPDES VA0025658, Major-Municipal
104.61	Discharge – Little Falls Run STP, VPDES VA0076392, Major-Municipal
104.47	DEQ Sampling Station 3-RPP104.47
103.77	Tributary with Discharge – Ruffins Creek, Culpeper Wood Preservers, VPDES VA0090468, Minor-Industrial
103.77	Tributary with Discharge – Ruffins Pond, Vulcan Construction Materials, VPDES VAG110098, Ready-Mix Concrete GP
99.05	Discharge – Aggregate Industries MAR – Hayfield Sand and Gravel, VPDES VAG840195, Non-Metallic Mineral Mining GP
98.81	DEQ Sampling Station 3-RPP098.81
96.5	Industrial Water Supply – VA0087645, SEI Birchwood, Minor-Industrial, 6.6 MGD maximum intake
96.57	Discharge - SEI Birchwood, VA0087645, Minor-Industrial, 1.14 MGD maximum
95.58	Tributary with Discharge – Birchwood Creek- UT , Greenhost Inc., VA0090654, Minor-Industrial, 1.9 MGD maximum
93.52	Discharge – Four Winds Campground, VPDES VA0060429, Minor-Municipal
91.60	Tributary with Discharge – Birchwood Creek, UT, Royster Clark Inc – Sealston, VPDES VA0088374, Minor-Industrial
91.55	DEQ Sampling Station 3-RPP091.55
91.2	Discharge – Hopyard Farms Wastewater Treatment Plant, VPDES VA0089338, Minor-Municipal
86.65	Tributary with Discharge – Rappahannock River-UT, Haymount WWTF, VPDES VA0089125, Minor-Municipal (not built)
80.19	U.S. Route 301 Bridge at Port Royal
80.19	DEQ Sampling Station 3-RPP080.19

TABLE 3 GENERAL PERMITS IN WATERBODY VAN-E20E		
Concrete General		**Receiving Stream**
VAG110106	Titan Virginia Ready Mix LLC - New Post RM Plant	Rappahannock River
VAG110093	Titan Virginia Ready Mix LLC - Stafford	England Run, UT
VAG110095	Aggregate Industries MAR - Falmouth	Rappahannock River, UT
VAG110128	Rowe Concrete LLC - King George Plant	UT, Guitcatic Run
VAG110128	Rowe Concrete LLC - King George Plant	UT, Guitcatic
VAG110270	Aggregate Industries MAR - Albion	none
Non-Metallic Mineral Mining		**Receiving Stream**
VAG840112	Aggregate Industries MAR-King George Sand and Gravel	Rappahannock River
VAG840112	Aggregate Industries MAR-King George Sand and Gravel	Rappahannock River, UT
VAG840096	Martin Marietta - Carmel Church	Long Creek
Petroleum		**Receiving Stream**
VAG830008	Curtis Brothers Trucking	Falls Run
Storm Water Industrial		**Receiving Stream**
VAR051091	Anderson Oil Company - Bulk Storage Terminal	Rappahannock River, UT
VAR051423	FMC Wastewater Treatment Facility	Rappahannock River
VAR051809	Fredericksburg Wastewater Treatment Facility	Rappahannock River
VAR051420	Little Falls Run Wastewater Treatment Facility	Rappahannock River
VAR051422	Massaponax Wastewater Treatment Facility	Rappahannock River
VAR051414	King George Landfill & Recycling Center	Birchwood Run
VAR051012	Virginia Paving Company - Fredericksburg Plant	Massaponax Creek
VAR050987	BFI Fredericksburg Recyclery	Hazel Run, UT
VAR051012	Virginia Paving Company - Fredericksburg Plant	Massponax Creek, UT

13. Material Storage:

TABLE 4 -- MATERIAL STORAGE		
Materials Description	**Materials Description**	**Spill/Stormwater Prevention Measures**
Polymer	Three 275-Gallon Polymer Totes	Storage is in the Dewatering Building, which contains a drain that discharges to the head of the plant.
Dry Soda Ash	800 Pounds	Storage is in the Return Activated Sludge (RAS) Building, which contains a drain that discharges to the head of the plant.
Dry Lime	40 Tons	Storage is in the lime silo adjacent to the Dewatering Building.
Diesel Fuel for Utility Tractor	40 gallons	Storage is in the Dewatering Building loading bay, which contains a drain that discharges to the head of the plant.
Diesel Fuel	6,000 Gallons	Storage is the fuel tank adjacent to the plant's backup generator. The tank is double hulled.
Gear Oil	One 55-Gallon Drum	Storage is in the maintenance shop, which contains a drain that discharges to the head of the plant. The drum is stored on a spill containment pallet.
Hydraulic Oil	One 55-Gallon Drum	Storage is in the maintenance shop, which contains a drain that discharges to the head of the plant. The drum is stored on a spill containment pallet.
Used Oil	One 55-Gallon Drum	Storage is in the maintenance shop, which contains a drain that discharges to the head of the plant. The drum is stored on a spill containment pallet.
Gasoline	25 Gallons	Storage is in the Dewatering Building outside the loading bay, which contains a drain that discharges to the head of the plant.

14. Site Inspection: Performed by Anna Westernik on May 23, 2012 (see **Attachment 4**).

15. Receiving Stream Water Quality and Water Quality Standards:

a. Ambient Water Quality Data

This facility discharges into an upstream segment of the freshwater tidal Rappahannock River at Rivermile 107.99; the nearest DEQ monitoring station is 3-RPP107.91, located approximately 0.08 miles downstream from the Fredericksburg WWTF Outfall 001 discharge. Sufficient excursions from the maximum *E. coli* bacteria criterion were recorded at this station and at Station 3-RPP110.57 to assess the stream as not supporting the recreation use for the 2012 water quality assessment.

Sampling at the DEQ Fish Tissue/Sediment Station 3-RPP107.33 (located approximately 1.31 miles downstream of Outfall 001 of the Fredericksburg WWTF) has found sufficient excursions above the fish tissue value for PCBs. A Virginia Department of Health Fish Consumption Advisory extends from the I-95 Bridge above the City of Fredericksburg to the mouth of the Rappahannock River near Stringray Point. The PCB findings resulted in the waters being assessed as not supporting the fish consumption use goal for the 2012 water quality assessment. Additionally, excursions of the risk-based tissue screening value of 270 ppb for arsenic in fish tissue was recorded in one species of fish at Monitoring Station 3-RPP107.33 in 2006.

Significant portions of the Chesapeake Bay and its tributaries are listed as impaired on Virginia's 303(d) list of impaired waters for not meeting the aquatic life use support goal. Additionally, the 2010 Virginia Water Quality Assessment 305(b)/303(d) Integrated Report indicates that much of the mainstem Bay does not fully support this use support goal under Virginia's Water Quality Assessment guidelines. Nutrient enrichment is cited as one of the primary causes of impairment. EPA issued the Bay TMDL on December 29, 2010. It was partly based on the Watershed Implementation Plans developed by the Bay watershed states and the District of Columbia.

The Chesapeake Bay TMDL addresses all segments of the Bay and its tidal tributaries that are on the impaired waters list due to nutrients and sediments. A maximum aggregate watershed pollutant loading necessary to achieve the Chesapeake Bay's water quality standards has been identified. This aggregate watershed loading is divided among the Bay states and their major tributary basins, as well as by major source categories (i.e. wastewater, urban storm water, onsite/septic agriculture, air deposition). Nutrient loadings discharged from this facility and hence, the provisions of the Chesapeake Bay TMDL, are controlled by VAN020095, the Nutrient Discharge General Permit. The maximum Total Nitrogen and Total Phosphorus loadings allowed to be discharged by the Fredericksburg WWTF are 54,820 lbs./yr. and 4,112 lbs./yr., respectively.

The wildlife and aquatic life uses are considered fully supporting. Shellfish use was not assessed.

The full planning statement is found in **Attachment 5.**

b. Receiving Stream Water Quality Criteria

Part IX of 9VAC25-260(360-550) designates classes and special standards applicable to defined Virginia river basins and sections. The receiving stream, the Rappahannock River, is located within Section 1 of the Rappahannock River Basin and designated as Class II water.

Class II tidal waters in the Chesapeake Bay and it tidal tributaries must meet dissolved oxygen concentrations as specified in 9VAC25-260-185 and maintain a pH of 6.0-9.0 standard units as specified in 9VAC25-260-50. In the tidal freshwater Rappahannock River area, Class II waters must meet the Migratory Fish Spawning and Nursery Designated Use from February 1 through May 31. For the remainder of the year, these tidal waters must meet the Open Water use. The applicable dissolved oxygen concentrations are presented **Attachment 6.**

This discharge segment of the Rappahannock is located in the tidal freshwater zone. This zone extends from the fall line of the Rappahannock River to Buoy 37 near Tappahannock. Freshwater, numerical water quality criteria, as opposed to saltwater criteria (excluding dissolved oxygen, pH, temperature, and chlorine), apply to this tidal freshwater zone.

Ammonia:

The Water Quality Criteria for Ammonia are dependent on the instream temperature and pH. The 90th percentile temperature and pH values are used because they best represent the critical design conditions of the receiving stream. The baseline 90th percentile pH and temperature values of 7.5 S.U. and 26°C in the 1995 permit reissuance were derived from weekly samples collected by the City of Fredericksburg Department of Public Works staff at the Mayfield Bypass Bridge during the period of January 1991 through May 1995. This station is located upstream of the outfalls for the City of Fredericksburg WWTF, FMC WWTF, Massaponax WWTF, and the Little Falls Run WWTP.

For this permit reissuance, staff has reevaluated the receiving stream ambient monitoring data for pH and temperature using data collected from DEQ Ambient Monitoring Station 3-RPP104.47 (located approximately 3.52 rivermiles below the Fredericksburg WWTF Outfall 001) during the period of April 2007 to December 2009. It is staff's best professional judgment that Monitoring Station 3-RPP104.47 is a good representation of the mixing of effluent discharge and stream flow in the tidal freshwater portion of the Rappahannock River. No significant differences from the pH and temperature values originally used to establish ammonia criteria in the 1995 permit reissuance were found. The 90th percentile pH and temperature values calculated for the 1995 permit reissuance from the downstream monitoring station data are 7.6 S.U. and 28°C. Hence, the 90th pH and temperature values derived from the 1995 permit reissuance are being carried forward as part of this permit reissuance. A default winter temperature of 15°C was used. See **Attachment** 7 for the 90th percentile pH and temperature values derived from DEQ Ambient Monitoring Station 3-RPP104.47 data.

The seasonal tiers for the Rappahannock River are November through April and May through October. These tiers, established by the VIMS Model (**Attachment 8**), reflect the division between winter and summer periods relative to temperature in the Rappahannock River.

Metals Criteria:
The Water Quality Criteria for some metals are dependent on the receiving stream's hardness (expressed as mg/L calcium carbonate). The average hardness of the receiving stream determined through analysis of the data from monitoring stations 3-RPP107.91 and 3-RPP104.47 for the period of April 1992 to May 2001 is 29 mg/L. The average hardness of the effluent from all the major wastewater treatment plants in the upper tidal portion of the Rappahannock River ranges from 57 to 125 mg/L. It is intuitive that under design conditions the instream hardness will begin to approach that of the hardness from the wastewater treatment plants. Due to the presence of multiple dischargers in the upper tidal portion of the Rappahannock River and the uncertainty of the mixing zones, staff does not feel it is feasible to perform an accurate mass balance between the hardness of the effluent from the wastewater treatment plants and the receiving stream. A hardness value of 50 mg/L, as recommended by DEQ guidance, should adequately estimate the river hardness under design conditions. This hardness value was used to determine the water quality criteria for metals.

Bacteria Criteria:
The Virginia Water Quality Standards 9VAC25-260-170.A state that the following criteria shall apply to protect primary recreational uses in surface waters:

E. coli bacteria per 100 mL of water shall not exceed a monthly geometric mean of the following:

	Geometric Mean[1]
Freshwater *E. coli* (N/100 mL)	126

[1]For a minimum of four weekly samples taken during any calendar month

Attachment 9 details water quality criteria applicable to the receiving stream

c Receiving Stream Special Standards
The State Water Control Board's Water Quality Standards, River Basin Section Tables (9VAC25-260-360, 370 and 380) designates the river basins, sections, classes and special standards for surface waters of the Commonwealth of Virginia.

The receiving stream, the Rappahannock River, is located within Section 1 of the Rappahannock Basin. The receiving stream has been designated with a special standard of "a". According to 9VAC25-260-310.a, Special Standard "a" applies to all open ocean or estuarine waters capable of propagating shellfish or in specific areas where public or leased private shellfish beds are present, including those waters on which condemnation or restriction classifications are established by the State Department of Health. The fecal coliform bacteria standard is as follows: the geometric mean fecal coliform value for a sampling station shall not exceed an MPN (Most probable number) of 14 per 100 milliliters of sample and the 90th percentile shall not exceed 43 for a 5-tube, 3-dilution or 49 for a 3-tube, 3-dilution test. The shellfish are not to be so contaminated by radionuclides, pesticides, herbicides or fecal material that the consumption of shellfish might be hazardous. This same standard is also contained in 9VAC25-260-160., Fecal Coliform Bacteria; Shellfish Waters. This standard is used for the interpretation of instream monitoring data and not for setting fecal coliform effluent limitations.

On January 15, 2003, new bacteria standards in the Water Quality Standards (9VAC25-260-170.A.) became effective as did a revised disinfection policy, 9VAC25-260-170.B. These standards replaced the fecal coliform standard; thus, *E. coli* and enterococci bacteria became the criterion. It has been demonstrated that the limit for *E. coli* of 126 N/100 mL, which is applicable for Freshwater, is protective of Special Standard "a" and will be carried forward with this reissuance.

d Threatened or Endangered Species
The Virginia DGIF Fish and Wildlife Information System Database was searched on March 27, 2012 for records to determine if there are threatened or endangered species in the vicinity of the discharge. The following threatened or endangered species were identified within a 2 mile radius of the discharge: Atlantic Sturgeon, Dwarf Wedgemussel, Upland Sandpiper, Loggerhead Shrike, Bald Eagle, Green Floater, and Migrant Loggerhead Shrike. The limits proposed in this draft permit are protective of the Virginia Water Quality Standards and protect the threatened and endangered species found near the discharge.

The stream that the facility discharges to is within a reach identified as having an Anadromous Fish Use. It is staff's best professional judgment that the proposed limits are protective of this use.

16. Antidegradation (9VAC25-260-30):

All state surface waters are provided one of three levels of antidegradation protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

This receiving stream has been classified as Tier 1 because the treatment plant was constructed before adoption of the Virginia Water Quality Standards on March 30, 1992, and the wasteload allocations and effluent limitations were established to meet the water quality standards. Additionally, historical water quality impairments and/or observations indicating water quality concerns for the Rappahannock River were identified for aquatic plants and open water aquatic life use. These impairments were both first identified and listed in the 2006 303(d) list of impaired waters and were delisted in 2008 and 2010, respectively. The mainstem of the Rappahannock River has also been noted to have high chlorophyll a levels. These observations indicate that the water quality of the river is not exceptional, or exceeding the water quality standards. Finally, the VIMS Model (**Attachment 8**) predicted that the dissolved oxygen criteria for surface water in this area of the Rappahannock River are minimally met. Permit limits proposed have been established by determining wasteload allocations that will result in attaining and/or maintaining all water quality criteria applicable to the receiving stream, including narrative criteria. These wasteload allocations will provide for the protection and maintenance of all existing uses.

17. Effluent Screening, Wasteload Allocation, and Effluent Limitation Development:

To determine water quality-based effluent limitations for a discharge, the suitability of data must first be determined. Data is suitable for analysis if one or more representative data points are equal to or above the quantification level ("QL") and the data represent the exact pollutant being evaluated.

Next, the appropriate Water Quality Standards are determined for the pollutants in the effluent. Then, the Wasteload Allocations (WLA) are calculated. The WLA values are then compared with available effluent data to determine the need for effluent limitations. Effluent limitations are needed if the 97th percentile of the daily effluent concentration values is greater than the acute wasteload allocation or if the 97th percentile of the four-day average effluent concentration values is greater than the chronic wasteload allocation. In the case of ammonia evaluations, limits are needed if the 97th percentile of the thirty-day average effluent concentration values is greater than the chronic WLA. Effluent limitations are based on the most limiting WLA, the required sampling frequency, and statistical characteristics of the effluent data.

a) Effluent Screening:
Effluent data obtained from monitoring required by the permit application and the discharge monitoring reports (DMRs) has been reviewed and determined to be suitable for evaluation. Chloroform, copper, and zinc were detected above their respective quantification levels. The average level of chloroform found to be present in the discharge per the VPDES permit application submitted in May 2012 was 2.3 µg/L. This value is well below the human health surface water criteria of 11,000 µg/L (see **Attachment 9**). Therefore, no further evaluation of this data is necessary. Copper and zinc require determination of a wasteload allocation. The 2012 reissuance file contains a summary of monitoring data.

b) Determining Wasteload Allocations

Acute Toxicity - DEQ-Guidance Memorandum 00-2011 states that for surface discharges into tidal estuaries or estuarine embayments, the acute wasteload allocation WLAa should be set at two times the acute standard because initial mixing in these circumstances is limited and lethality in the allocated impact zone must be prevented. The 2X factor is derived from the fact that the acute standard or criteria maximum concentration (CMC) is defined as one half of the final acute value (FAV) for a specific toxic pollutant. The FAV prevents acute toxicity 95% of time for the genera tested. If the acute value is one half the FAV, then two times the acute standard should equal the FAV or equal an acceptable value for preventing lethality.

Chronic Toxicity - DEQ-Guidance Memorandum 2011 states that for surface discharges into tidal estuaries, estuarine embayments, or the open ocean, the WLAc should be based upon site specific data on waste dispersion or dilution when available and appropriate. Where wastewater dispersion/dilution data are not available, a dilution ration of 50:1 may be used. While staff acknowledges that some dilution is occurring in the Rappahannock River, it is not appropriate to use the 50:1 dilution ratio. There are three other municipal discharges in the area that greatly influence the mixing zone, and the FMC WWTF discharge is close to the fall line. Therefore, large tidal influences may not be realized. Recognizing that 50:1 is too high and no dilution is too stringent (end of pipe) because some mixing is occurring, staff has chosen to use an

instream waste concentration of 50% until more evidence becomes available that demonstrates a more appropriate dilution ratio.

Further justification for not using the 50:1 dilution ratio and using the 2X factor to determine chronic wasteload allocations is found by calculating the cumulative Instream Waste Concentration (IWC%) of all four Upper Rappahannock Dischargers (Little Falls Run - 13 MGD, Massaponax - 9.4 MGD, Fredericksburg - 4.5 MGD, and FMC -4.0 MGD) at a 7Q10 flow. The flows from all facilities are critical since they all impact the available mixing zone.

$$IWC = \frac{Qe}{Qe + Qs} = \frac{13\ MGD + 9.4\ MGD + 4.5\ MGD + 4.0\ MGD}{(13\ MGD + 9.4\ MGD + 4.5\ MGD + 4.0\ MGD) + 30\ MGD} = 0.51 \quad (51\%)$$

Where: Qe = The combined flows of all four freshwater tidal Rappahannock River dischargers.
Qs = The 7Q10 of the receiving river at the fall line (**See Attachment 1**).

An IWC of 50% would affect wasteload allocations in the same manner as a dilution factor of 2X.

Staff derived wasteload allocations where parameters are reasonably expected to be present in an effluent and where effluent data indicate the pollutant is present in the discharge above quantifiable levels. With regard to the Fredericksburg WWTF Outfall 001 discharge, monitoring data indicate that wasteload allocations be calculated for ammonia, total residual chlorine, copper, and zinc. Ammonia and total residual chlorine require determination of a wasteload allocation because the discharge is from a sewage treatment using chlorine disinfection. See **Attachment 9** for WLA derivations.

c) Virginia Institute of Marine Science Rappahannock River Model

Stafford County, Spotsylvania County, and the City of Fredericksburg sponsored a water quality model for the upper Rappahannock River estuary developed by the Virginia Institute for Marine Science (VIMS) entitled a Modeling Study of th Water Quality of the Upper Rappahannock River or the VIMS model. This model was approved by the State Water Control Board Director on December 6, 1991 and has been used to determine effluent limitations for VPDES discharges in the uppe Rappahannock River since then.

This model had been run on the following occasions: August 1995, for the issuance of the Haymount permit and the flow expansion at the Fredericksburg STP; August 1996, for the issuance of the Hopyard permit; March 1997, for changes in flov and production at White Packing; April 1999, to accommodate flow expansions at the Little Falls Run WWTF and the Massaponax WWTF; April 2003 for the expansion of the proposed Hopyard WWTP to 0.5 MGD; January 2005, to accommodate an additional flow tier of 13.0 MGD in the Little Falls Run VPDES permit; August 2006 to model the loading for the Fredericksburg STP at 4.5 MGD, and March 2010 to accommodate the transfer of 1.4 MGD of flow from the FMC WWTF to the Massaponax WWTF. A summary of the numerous scenarios analyzed and predicted outcomes using the VIM model is found in **Attachment 8.**

d) Effluent Limitations Toxic Pollutants, Outfall 001

9 VAC 25-31-220.D requires limits be imposed where a discharge has a reasonable potential to cause or contribute to an instream excursion of water quality criteria. Those parameters with WLAs that are near effluent concentrations are evaluated for limits.

The VPDES Permit Regulation at 9 VAC 25-31-230.D requires that monthly and weekly average limitations be imposed for continuous discharges from POTWs and monthly average and daily maximum limitations be imposed for all other continuous non-POTW discharges.

1) Ammonia:

In accordance with current DEQ guidance, staff used a default data point of 9.0 mg/L and the calculated WLAs to derive ammonia limits. An ammonia monthly average of 4.2 mg/L and a weekly average limit of 5.0 mg/L were derived for this discharge for the low flow period of May through October; whereas, a monthly average limit of 8.5 mg/L and a weekly average limit of 10 mg/L were derived for this discharge for the high flow period of November through April (see **Attachment 10).**

The VIMs model suggests a monthly average total kjeldahl nitrogen (TKN) limitation of 7.0 mg/L to control ammonia levels during May through October. It is generally accepted that TKN consists of approximately 60% ammonia in raw wastewater. As the waste stream is treated, the ammonia component of TKN is converted to

Nitrate (NO_3) and Nitrite (NO_2). The VIMS Model shows that neither an ammonia or TKN limit is needed during the high flow period (November through April).

The low flow TKN limit of 7.0 mg/L is protective against toxicity during the low flow period; the receiving stream is protected during the high flow months as demonstrated by the tidal freshwater Rappahannock River ambient ammonia monitoring data shows that the instream ammonia concentrations values are well below the ammonia criteria (see **Attachment 11** for criteria and ammonia as nitrogen monitoring values from DEQ Monitoring Stations 3-RPP104.47, 3-RPP106.01, 3-RPP107.91, and 3-RPP110.57). In summary, this analysis shows that the established monthly average TKN limit of 7.0 mg/L for May through October and the absence of an ammonia limit for November through April are protective of the ammonia water quality criteria in the receiving stream.

2) Metals/Organics:
Evaluation of the zinc DMR data from the fourth quarter 2007 through the second quarter 2012 indicates that limits are not needed (see **Attachment 10**). However, per the Virginia VPDES Permit Regulation at 9 VAC-31-220.L and §402(o)(2) of the Clean Water Act, the current monthly average and weekly average zinc limits of 130 µg/L shall remain in the permit for the following reasons: no substantial alteration has occurred at the treatment works since the last permit reissuance that may affect treatment of zinc, no new information has been provided regarding changes to the collection system dischargers that may affect the level of zinc being discharged to the treatment works, no events have occurred that are beyond the control of the permittee, and the permittee is able to meet the zinc limits. However, the monitoring frequency shall be reduced from a quarterly to an annual basis in this permit reissuance, with the requirement to increase the monitoring frequency to a quarterly basis if the limit is exceeded during annual monitoring.

Evaluation of copper data collected on March 10, 2009, June 2, 2009, September 9, 2009, December 30, 2009, March 4, 2010, June 9, 2010, September 9, 2010, December 7, 2010, March 9, 2011, June 2, 1011, September 7, 2011, October 5, 2011, November 2, 2011, December 1, 2011, December 21, 2011, and March 13, 2012, shows that copper limits are not needed (**Attachment 10**). However, annual copper monitoring will be required to determine if copper levels in the effluent may become a problem to the facility because elevated copper concentrations present in some samples may have necessitated a copper limit if a smaller data set were used to determine limits. A reopener clause is included in this permit.

The values for copper and zinc must be expressed in the total recoverable form. A 1:1 ratio between dissolved and total recoverable metals is assumed since the nature of the receiving waters (numerous inputs and tidal influences) complicates the determination of a total to dissolved metals ratio. Variance from this assumption is allowed if the permittee conducts a chemical translator study.

e) Effluent Limitations and Monitoring, Outfall 001 – Conventional and Non-Conventional Pollutants
With the exception of expressing limitations as two significant digits, no other changes to dissolved oxygen (D.O.), carbonaceous biochemical oxygen demand-5 day ($CBOD_5$), total suspended solids (TSS), Total Kjedahl Nitrogen (TKN), phosphorus, and pH limitations are proposed. D.O., $CBOD_5$, and TKN limitations are based on the March 2010 VIMS Model (**Attachment 8**).

It is staff's practice to equate the TSS limits with the $CBOD_5$ limits. TSS limits are established to equal $CBOD_5$ limits since the two pollutants are closely related in terms of treatment of domestic sewage.

pH limitations are set at the water quality criteria.

E. coli limitations are established in accordance with the Water Quality Standards 9 VAC 25-260-170.

f) Effluent Maximum Annual Limitations and Monitoring, Outfall 001 – Nutrients

VPDES Regulation 9VAC25-31-220(D) requires effluent limitations that are protective of both the numerical and narrative water quality standards for state waters, including the Chesapeake Bay. No annual Total Nitrogen (TN) or Total Phosphorus (TP) concentration limits are required by 9VAC25-40-70.A for the 4.5 MGD design flow.

As discussed in Section 15, significant portions of the Chesapeake Bay and its tributaries are listed as impaired, with nutrient enrichment cited as one of the primary causes. Virginia has committed to protecting and restoring the Bay and its tributaries. Only concentration limits are now found in the individual VPDES permit when the facility installs nutrient removal technology. The basis for the concentration limits is 9VAC25-40 - *Regulation for Nutrient Enriched Waters and Dischargers within the Chesapeake Bay Watershed,* which requires new or expanding discharges with design flows of ≥0.04 MGD to treat for TN and TP to either BNR levels (TN = 8 mg/L; TP = 1.0 mg/L) or SOA levels (TN = 3.0 mg/L and TP = 0.3 mg/L). There are no TN or TP annual concentration limits in this permit since this facility is not expanding.

This facility has also obtained coverage under 9VAC25-820 *General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia.* This regulation specifies and controls the nitrogen and phosphorus loadings from facilities and specifies facilities that must register under the general permit. Nutrient loadings for those facilities registered under the general permit as well as compliance schedules and other permit requirements, shall be authorized, monitored, limited, and otherwise regulated under the general permit and not this individual permit. This facility has coverage under this General Permit; the permit number is VAN020095. TN Annual Loads and TP Annual Loads from this facility are found in 9VAC25-720 – *Water Quality Management Plan Regulation,* which sets forth TN and TP maximum wasteload allocations for facilities designated as significant discharges, i.e., those with design flows of ≥0.5 MGD above the fall line and ≥0.1 MGD below the fall line.

Monthly phosphorus limitations are based on the VIMS Model entitled *A Modeling Study of the Water Quality of the Upper Tidal Rappahannock River.* In the past, elevated chlorophyll a levels in the upper segment of the River in the Fredericksburg area have indicated eutrophication to be present; phosphorus contributes directly to chlorophyll a growth. To prevent future increases in chlorophyll a concentrations in this segment of the river, total phosphorus loadings will not be allowed to increase beyond the current limits for the Fredericksburg WWTF, the FMC WWTF, the Massaponax WWTF, and the Little Falls Run WWTP. The total phosphorus mass limits for the Fredericksburg WWTF will remain at 58 lb/day and a monthly average concentration of 2.0 mg/L.

g) Effluent Limitations and Monitoring Summary.

The effluent limitations are presented in the following table. Limits were established for pH, $CBOD_5$, TSS, D.O., TKN, *E. coli*, Total Phosphorus, and Total Recoverable Zinc.

The mass loading (kg/d) for $CBOD_5$ and TSS monthly and weekly averages were calculated by multiplying the concentration values (mg/l), with the flow values in MGD and a conversion factor of 3.785. The mass loading (lb/d) for TKN and TP monthly and weekly averages were calculated by multiplying the concentration values (mg/L) with the flow values (in MGD) and then a conversion factor of 8.345.

The VPDES Permit Regulation at 9VAC25-31-30 and 40 CFR Part 133 require that the facility achieve at least 85% removal for CBOD and TSS (or 65% for equivalent to secondary). The limits in this permit are water-quality-based effluent limits and result in greater than 85% removal.

Sample Type and Frequency are in accordance with the recommendations in the VPDES Permit Manual.

18. Antibacksliding:

All limits in this permit are at least as stringent as those previously established in the August 11, 2009 permit modification in which total residual chlorine monitoring was removed in response to replacing chlorine disinfection with ultraviolet disinfection. Backsliding does not apply to this reissuance.

19.a Effluent Limitations/Monitoring Requirements:

Design flow is 4.5 MGD.

Effective Dates: During the period beginning with the permit's effective date and lasting until the expiration date.

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Ty
Flow (MGD)	NA	NL	NA	NA	NL	Continuous	TIRE
pH	1	NA	NA	6.0 S.U.	9.0 S.U.	1/D	Grab
$CBOD_5$	1,2	13 mg/l 220 kg/day	20 mg/l 340 kg/day	NA	NA	1/D	24H-C
TSS	3	13 mg/l 220 kg/day	20 mg/l 340 kg/day	NA	NA	1/D	24H-C
DO	1,2	NA	NA	6.0 mg/l	NA	1/D	Grab
TKN (May - Oct)	1,2	7.0 mg/l 260 lb/day	10 mg/l 380 lb/day	NA	NA	1/D	24H-C
E. coli (Geometric Mean)	1	126 n/100mls[a]	NA	NA	NA	1/D	Grab
Total Phosphorus	1,2,3	2.0 mg/l 58 lb/day	NA	NA	NA	1/W	24H-C
Total Recoverable Zinc	1	130 µg/L	130 µg/L	NA	NA	1/Y[b]	Grab
Total Recoverable Copper (µg/L)	1	NL	NL	NA	NA	1/Y	Grab
Chronic Toxicity - *C. dubia* (TU_c)	NA	NA	NA	NA	NL	1/Y[c]	24H-C
Chronic Toxicity - *P. promelas* (TU_c)	NA	NA	NA	NA	NL	1/Y[c]	24H-C

The basis for the limitations codes are:

1. Water Quality Standards
2. VIMS Model- **Attachment 8**
3. Best Professional Judgment

MGD = Million gallons per day.
NA = Not applicable.
NL = No limit; monitor and report.
TIRE = Totalizing, indicating and recording equipment.
S.U. = Standard units.

1/D = Once every day.
1/W = Once every week.
1/Y = Once every year.

24H-C = A flow proportional composite sample collected manually or automatically, and discretely or continuously, for the entire discharge of the monitored 24-hour period. Where discrete sampling is employed, the permittee shall collect a minimum of twenty-four (24) aliquots for compositing. Discrete sampling may be flow proportioned either by varying the time interval between each aliquot or the volume of each aliquot. Time composite samples consisting of a minimum twenty-four (24) grab samples obtained at hourly or smaller intervals may be collected where the permittee demonstrates that the discharge flow rate (gallons per minute) does not vary by 10% or more during the monitored discharge.

Grab = An individual sample collected over a period of time not to exceed 15-minutes.

(a) Samples shall be collected between the hours of 10 A.M. and 4 P.M.
(b) Monitoring shall be increased to a quarterly basis if the annual sample exceeds the permit limits. The quarterly sampling periods are January – March, April – June, July – September, and October – December. Reporting for quarterly sampling shall occur on January 10, April 10, July 10, and October 10 of each year.
(c) See toxicity monitoring requirements in Part I.D of the permit.

20. Other Permit Requirements:

a. Permit Section Part I.B. contains quantification levels and compliance reporting instructions.
9VAC25-31-190.L.4.c. requires an arithmetic mean for measurement averaging and 9VAC25-31-220.D. requires limits be imposed where a discharge has a reasonable potential to cause or contribute to an in-stream excursion of water quality criteria. Specific analytical methodologies for toxics are listed in this permit section as well as quantification levels (QLs) necessary to demonstrate compliance with applicable permit limitations or for use in future evaluations to determine if the pollutant has reasonable potential to cause or contribute to a violation. Required averaging methodologies are also specified.

b. Permit Section Part I.C. details the requirements of a Pretreatment Program.
The VPDES Permit Regulation at 9 VAC 25-31-730. through 900. and the Federal Pretreatment Regulations found in 40 CFR Part 403, requires POTWs with a design flow of >5.0 MGD and receiving from Industrial Users (IUs) pollutants that pass through or interfere with the operation of the POTW or are otherwise subject to pretreatment standards to develop a pretreatment program.

When the permit for the Fredericksburg WWTF was reissued in 1996, the facility was required to develop a pretreatment program due to the presence of categorical users within the system. The Pretreatment Program for the City of Fredericksburg was first approved on July 31, 1996. The City of Fredericksburg has two Significant Industrial Users (SIUs) regulated through this program (Virginia Semiconductor, Inc. and Goodwill Industries). Both SIUs also discharge to the FMC WWTF, owned and operated by Spotsylvania County, through the Fredericksburg WWTF.

The pretreatment program conditions in the proposed permit reissuance will include: implementation of the approved pretreatment program that complies with the Clean Water Act, the State Water Control Law, state regulations and the approved program.

c. Permit Section Part I.D. details the requirements for Whole Effluent Toxicity Program.
The VPDES Permit Regulation at 9VAC25-31-210 requires monitoring and 9VAC25-31-220.I, requires limitations in the permit to provide for and assure compliance with all applicable requirements of the State Water Control Law and the Clean Water Act. A Whole Effluent Toxicity Program is imposed for municipal facilities with a design rate >1.0 MGD; with an approved pretreatment program or required to develop a pretreatment program; or those determined by the Board to require a program based on effluent variability, compliance history, instream waste concentration, and receiving stream characteristics.

The Fredericksburg WWTF meets two of the above requirements; it is a POTW with a design rate >1.0 MGD and the facility has an approved pretreatment program. The Whole Effluent Toxicity Program uses bioassay-testing methods for measuring the potential for the effluent to cause toxicity in the receiving stream.

d. Permit Section Part 1.E. details requirements of the Sewage Sludge Management Plan, Sludge Monitoring and Additional Reporting Requirements.

1. Regulations:

The VPDES Permit Regulation (9VAC25-31-10 et seq.) has incorporated technical standards for the use or disposal of sewage sludge, specifically land application and surface disposal, promulgated under 40 CFR Part 503.

The Permit Regulation (9VAC25-31-420) also establishes the standards for the use or disposal of sewage sludge. This part establishes standards that consist of general requirements, pollutant limits, management practices, and operational standards for the final use or disposal of sewage sludge generated during the treatment of domestic sewage in the treatment works.

2. Evaluations:

a) The Fredericksburg WWTF is considered as Class I sludge management facility. The permit regulation (9VAC25-31-500) defines a Class I sludge management facility as any POTW required to have an approved pretreatment program defined under Part VII of the VPDES Permit Regulation (9VAC25-31-730 to 900) and/or any treatment works treating domestic sewage sludge that has been classified as a Class I facility by the Board because of the potential for its sewage sludge use or disposal practice to adversely affect public health and the environment.

b) The average pollutant concentrations from sewage sludge analyses provided as part of the Fredericksburg WWTF application for the permit reissuance are presented in Table 5. The analysis results are from samples collected from the first quarter of 2008 through the second quarter of 2012 and reported to DEQ with the DMR.

TABLE 5 – SEWAGE SLUDGE ANALYSES		
Pollutant	**Concentration (mg/kg dry weight)**	**Sample Type**
Arsenic	4.5 (Average Concentration)	Composite
Cadmium	1.0 (Average Concentration)	Composite
Copper	132 (Average Concentration)	Composite
Lead	11 (Average Concentration)	Composite
Mercury	0.78 (Average Concentration)	Composite
Molybdenum	5.0 (Maximum Concentration)	Composite
Nickel	12 (Average Concentration)	Composite
Selenium	2.9 (Average Concentration)	Composite
Zinc	213 (Average Concentration)	Composite

All sewage sludge applied to the land must meet the ceiling concentration for the pollutants listed in Table 6. Additionally, the land-applied sludge must meet either the pollutant concentration limits, the cumulative pollutant loading rate limits, or the annual pollutant loading rate limits listed in Table 6.

Cumulative pollutant loading limits or annual pollutant loading limits may be applied to sewage sludge exceeding pollutant concentration limits but meeting the ceiling concentrations depending upon the levels of treatment achieved and the form (bulk or bag) of sludge applied. Ceiling concentration limits are instantaneous values and pollutant concentration limits are monthly average values. Calculations of cumulative pollutant loading should be based on the monthly average values and the annual whole sludge application rate.

Table 6 -- SEWAGE SLUDGE POLLUTANT LIMITS				
Pollutant	**Ceiling Concentration Limits -- Sewage Sludge Applied to Land (mg/kg)***	**Pollutant Concentration Limits EQ and PC Sewage Sludge(mg/kg)***	**Cumulative Pollutant Loading Rate Limits CPLR Sewage Sludge (kg/hectare)**	**Annual Pollutant Rate Limits APLR Sewage Sludge (kg/hectare/356 day period)****
Arsenic	75	41	41	2.0
Cadmium	85	39	39	1.9
Copper	4,300	1,500	1,500	75
Lead	840	300	300	15
Mercury	57	17	17	0.85
Molybdenum	75	---	---	---
Nickel	420	420	420	21
Selenium	100	100	100	5.0
Zinc	7,500	2,800	2,800	140
Applicable to:	All sewage sludge that is land applied	Bulk sewage sludge and bagged sewage sludge	Bulk sewage sludge	Bagged sewage
Part VI –2006 VPDES Permit Reg	Table 1 9 VAC 25-31-540	Table 3 9 VAC 25-31-540	Table 2 9 VAC 25-31-540	Table 4 9 VAC 25-31-540

*Dry-weight basis
**Bagged sewage sludge is sold or given away in a bag or other container.

Comparing data in Tables 5 and 6 shows that metal concentrations in the Fredericksburg WWTF sewage sludge are significantly below the ceiling and PC concentration requirements.

3. Options for Meeting Land Application:

There are four equally safe options for meeting land application requirements. The options include the Exceptional Quality (EQ) option, the Pollutant Concentration (PC) option, the Cumulative Pollutant Loading Rate (CPLR) option, and the Annual Pollutant Loading Rate (APLR) option.

Pollutant Concentration (PC) is the type of sludge that may only be applied in bulk and is subject to general requirements and management practices; however, tracking of pollutant loadings to the land is not required. The sludge from the Fredericksburg WWTP is considered PC sewage sludge for the following reasons:

a) The bulk sewage sludge from the Fredericksburg WWTP meets the PC limits in Table 1 of VPDES Permit Regulation Part VI, 9 VAC 25-31-540.

b) The VPDES Permit Regulation, Part VI, Subpart D, (9VAC25-31-690 through 720) establishes the requirements for pathogen reduction in sewage sludge. The Fredericksburg WWTP is considered to produce a Class B sludge in accordance with the regulation (9VAC25-31-710.B.2. -- Class B - Alternative 2). Alternative 2 defines Class B sludge as,"Sewage sludge that is used or disposed that has been treated in a process that is equivalent to a Process to Significantly Reduce Pathogens (PSRP), as described in (9VAC25-31-710.D.)".

The Fredericksburg WWTF treats sludge using lime stabilization to reduce pathogens in accordance with the requirements of (9VAC25-31-710.D.3.).

c) The VPDES Permit Regulation, Part VI, Subpart D, (9VAC25-31-690 through 720) also establishes the requirements for Vector Attraction Reduction in sewage sludge. Based on the information supplied with the VPDES Sludge Application, the Fredericksburg WWTF meets the requirements for Vector Attraction Reduction as defined by (9VAC25-31-720.B.1): the pH of sewage sludge shall be raised to 12 or higher by alkaline additions and; without the addition of more alkaline material, shall remain at 12 or higher for two hours and then at 11.5 or higher for an additional 22 hours.

4. Parameters to be Monitored:

In order to assure the sludge quality, the following parameters require monitoring: Arsenic, Cadmium, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium, and Zinc. Since the Fredericksburg WWTF has contracted the land application responsibilities to Synagro Mid-Atlantic, Inc., they will not be required to monitor soils or the nutrient content of the sludge.

5. Monitoring Frequency:

The monitoring frequency is based on the amount of sewage sludge applied in a given 365-day period. The permit application indicates that the total dry metric tons of sewage sludge generated at the Fredericksburg WWTP are 878 dry metric tons per 365-day period. The monitoring frequency for facilities that produce 290 to 1,500 dry metric tons of sewage sludge in a 365-day period is once each quarter.

The Fredericksburg WWTP is required to provide the results of all monitoring performed in accordance with Part I.A., and information on management practices and appropriate certifications no later than February 19th of each year (as required by the 503 regulations) to the Northern Regional Office of the Department of Environmental Quality (DEQ-NRO). Each report must document the previous calendar year's activities.

6. Sampling:

Representative sampling is an important aspect of monitoring. Because the pollutant limits pertain to the quality of the final sewage sludge applied to the land, samples must be collected after the last treatment process prior to land application. Composite samples should be required for all samplings from this facility.

7. Sludge Management Plan (SMP):

The SMP is required to be part of the VPDES permit application. The VPDES Sewage Sludge Permit Application Form and its attachments will constitute the applicant's SMP. Any proposed sewage treatment works treating domestic sewage must submit a SMP with the appropriate VPDES permit application forms at least 180 days prior to the date proposed for commencing operations. The permittee shall conduct all sewage sludge use or disposal activities in accordance with the SMP approved with the issuance of this permit. Any proposed changes in the sewage sludge use or

disposal practices or procedures followed by the permittee shall be documented and submitted for DEQ review and approval no less than 90 days prior to the effective date of the changes.

Upon approval, the SMP becomes an enforceable part of the permit. The permit may be modified or alternatively revoked and reissued to incorporate limitations/conditions necessitated by substantial changes in sewage sludge use or disposal practices.

The Fredericksburg WWTP has submitted the VPDES Sewage Sludge Permit Application Form and its attachments. The application is on file at DEQ-NRO.

8. Reporting Requirements:

The reporting requirements are for POTWs with a design flow rate equal to or greater than 1 MGD (majors), POTWs that serve a population of 10,000 or greater, and Class I sludge management facilities. A permit special condition that requires these generators to submit an annual report on February 19th of each year is included. The Fredericksburg WWTP shall use the Discharge Monitoring Report (DMR) forms as part of the annual report. Refer to Tables 7 and 8 of this fact sheet for guidance regarding completion of the DMRs. In addition to the DMR forms, the generators who land apply sewage sludge are responsible for submitting the additional information required by 9VAC25-31-590 (*i.e.*, appropriate certification statements, descriptions of how pathogen and vector attraction reduction requirements are met, descriptions of how applicable management practices are being met, and descriptions of how applicable site restrictions are being met).

TABLE 7 – SEWAGE SLUDGE ANNUAL PRODUCTION MONITORING

Effective Dates: During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to manage sewage sludge according to the approved Sludge Management Plan (SMP). The pollutants in sewage sludge and land application sites shall be limited and monitored by the permittee as specified on form SP1 in accordance with Part I.A.2 of the permit.

Monitoring/Recording Requirement	Basis for Limits	Frequency	Method of Analysis
Annual Sludge Production (Dry Metric Tons per Year)	9 VAC 25-31-10 40 CFR Part 503	Once/Year	Measured/Calculated
Annual Sludge Land Applied (Dry Metric Tons per Year)	9 VAC 25-31-10 40 CFR Part 503	Once/Year	Measured/Calculated

TABLE 8-- SEWAGE SLUDGE CHEMICAL LIMITATIONS AND MONITORING REQUIREMENTS

Effective Dates: During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to manage sewage sludge according to the approved SMP. The pollutants in sewage sludge and land application sites shall be limited and monitored by the permittee as specified below and reported in accordance with Part I.A.2 of the permit. Form S01 of the DMR must be completed each time sludge is land applied. Analysis must be based on a representative sample of Fredericksburg WWTF sludge th is being
land applied.

SLUDGE CHARACTERISTICS	BASIS FOR LIMITATIONS	LIMITATIONS		MONITORING REQUIREMENTS	
		CEILING CONCENTRATION MAX (mg/kg)	MONTHLY AVG (mg/kg)	FREQUENCY	SAMPLE TYPE
Percent Solids (%)	9 VAC 25-31-10	NA	NL	1/3M	Composite
Total Arsenic	9 VAC 25-31-10	75	41	1/3M	Composite
Total Cadmium	9 VAC 25-31-10	85	39	1/3M	Composite
Total Copper	9 VAC 25-31-10	4300	1500	1/3M	Composite
Total Lead	9 VAC 25-31-10	840	300	1/3M	Composite
Total Mercury	9 VAC 25-31-10	57	17	1/3M	Composite
Total Molybdenum	9 VAC 25-31-10	75	NA	1/3M	Composite
Total Nickel	9 VAC 25-31-10	420	420	1/3M	Composite
Total Selenium	9 VAC 25-31-10	100	100	1/3M	Composite
Total Zinc	9 VAC 25-31-10	7,500	2,800	1/3M	Composite
Level of Pathogen Requirements Achieved		The approved SMP Indicates that Class B Sludge is produced when the current level of treatment is used. When this type of treatment is used, a number 2 should be reported on the DMR under item 688 (2).			
Pathogen Alternative Used		The approved SMP indicates that Alternative 2, lime stabilization, is used. This is represented by a number 2 on the DMR under item 689 (2).			
Vector Attraction Reduction Alternative Used		The approved SMP indicates that Option 6, raising sludge pH under specified conditions, is used for Vector Attraction Reduction. This is represented by a number 6 on the DMR under item 690 (6).			

NL = No limitation, monitoring required. NA = Not Applicable 1 /Y = Once per year.
1 /5Y = Once per every five years.

(1) Dry weight basis unless otherwise stated.

(2) Pathogen Reduction. (Class B, Alternative 2 – Lime Stabilization): Sewage sludge is treated through raising the pH of the sludge t 12 S.U. for at least two hours. The permittee shall adequately perform monitoring and maintain bench sheets to ensure that the required pH and holding time are strictly adhered to. Copies of the bench sheets shall be submitted with annual reports for sludge analysis.

(3) Vector Attraction Reduction, Option 6 – (Raising Sludge pH Under Specified Conditions): As stated in 9 VAC 25-31-720.B.6, the pH of the sewage sludge is to be raised to 12 S.U. or higher and maintained at 11.5 S.U. – 12 S.U. for at least 22 hours without the addition of more alkaline material. The permittee shall adequately monitor the sludge pH and holding time to ensure that the required reduction is being achieved. Copies of the bench sheet shall be submitted with annual reports for sludge analysis.

(4) All sampling shall be collected and analyzed in accordance with the approved Operations and Maintenance (O&M) Manual and SMP.

9. Records Keeping:

This special condition outlines record retention requirements for sludge meeting Class B pathogen reduction and vector attraction reduction alternative 1-10. Table 9 presents the record keeping requirements.

TABLE 9 -- RECORD KEEPING FOR PC SLUDGE	
1	Pollutant concentrations of each pollutant in Part I.A.2. of the permit;
2	Description of how the pathogen reduction requirement in Part I.A.2. of the permit are met;
3	Description of how the vector attraction requirements in Part I.A.2. of the permit are met;
4	Description of how the management practice specified in the approved Sludge Management Plan and/or the permit are met;
5	Description of how the site restriction specified in the Sludge Management Plan and/or the permit are met;
6	Certification statement in Part I.E.2.f. of the permit.

21. Other Special Conditions:

a. 95% Capacity Reopener. The VPDES Permit Regulation at 9VAC25-31-200.B.4. requires all POTWs and PVOTWs develop and submit a plan of action to DEQ when the monthly average influent flow to their sewage treatment plant reaches 95% or more of the design capacity authorized in the permit for each month of any three consecutive month period. This facility is a POTW.

b. Indirect Dischargers. Required by VPDES Permit Regulation, 9VAC25-31-200 B.1. and B.2. for POTWs and PVOTWs that receive waste from someone other than the owner of the treatment works.

c. O&M Manual Requirement. Required by Code of Virginia §62.1-44.19; Sewage Collection and Treatment Regulations, 9VAC25-790; VPDES Permit Regulation, 9VAC25-31-190.E. The permittee shall maintain a current Operations and Maintenance (O&M) Manual for the treatment works that is in accordance with Virginia Pollutant Discharge Elimination System Regulations, 9VAC25-31 and the Sewage Collection and Treatment Regulations, 9 VAC 25-790.

d. CTC, CTO Requirement. The Code of Virginia § 62.1-44.19; Sewage Collection and Treatment Regulations, 9VAC25-790 requires that all treatment works treating wastewater obtain a Certificate to Construct prior to commencing construction and to obtain a Certificate to Operate prior to commencing operation of the treatment works.

e. Licensed Operator Requirement. The Code of Virginia at §54.1-2300 et seq. and the VPDES Permit Regulation at 9VAC25-31-200.C., and Rules and Regulations for Waterworks and Wastewater Works Operators (18VAC160-20-10 et seq.) requires licensure of operators. This facility requires a Class I operator.

f. Water Quality Criteria Reopener. The VPDES Permit Regulation at 9VAC25-31-220 D. requires establishment of effluent limitations to ensure attainment/maintenance of receiving stream water quality criteria. Should effluent monitoring indicate the need for any water quality-based limitations, this permit may be modified or alternatively revoked and reissued to incorporate appropriate limitations.

g.. Reliability Class. The Sewage Collection and Treatment Regulations at 9VAC25-790 require sewage treatment works to achieve a certain level of reliability in order to protect water quality and public health consequences in the event of component or system failure. Reliability means a measure of the ability of the treatment works to perform its designated function without failure or interruption of service. The facility is required to meet reliability Class I.

h. Mixing Zone Study. The permittee may conduct a site specific mixing zone study for the receiving waters to determine wasteload allocations for toxic pollutants. The permittee may request that the permit be modified to reflect the results of the study.

i. Nutrient Reopener. 9VAC25-40-70.A. authorizes DEQ to include technology-based annual concentration limits in the permits of facilities that have installed nutrient control equipment, whether by new construction, expansion or upgrade. 9VAC25-31-390.A. authorizes DEQ to modify VPDES permits to promulgate amended water quality standards.

j. PCB Monitoring The permittee shall monitor the effluent at Outfall 001 for Polychlorinated Biphenyls (PCBs). DEQ will use these data for the development of the PCB TMDL for the Rappahannock River and for the Rappahannock River Watershed. The permittee shall conduct the sampling and analysis in accordance with the requirements specified below. At a minimum:

1) Monitoring and analysis shall be conducted in accordance with the most current version of EPA Method 1668 (The current approved version is 1668B (EPA 2008) or other equivalent methods capable of providing low-detection level, congener specific results. Any equivalent method shall be submitted to DEQ-NRO for review and approval prior to sampling and analysis. It is the responsibility of the permittee to ensure that proper QA/QC protocols are followed during the sample gathering and analytical procedures.

2) The permittee shall collect 2 wet weather samples and 2 dry weather samples during the term of the permit.

Wet weather samples shall be defined by the permittee based on the permittee's decision criteria for their facility. The wet weather decision criteria shall be submitted to DEQ-NRO prior to any PCB sampling and within 90 days of the permit reissuance for review and approval. The permittee shall maintain documentation to demonstrate that wet weather flows achieve these criteria. The documentation shall be available to DEQ-NRO upon request.

Dry weather samples are defined as those taken at Outfall 001 following at least a 72 hour period with no measurable rainfall, and influent levels are at normal base flows.

After the permittee has collected a wet weather sample and a dry weather sample, the permittee may request from DEQ a waiver for the second wet weather sample. Documentation shall be submitted with the request to demonstrate why another wet weather sample is not necessary for the TMDL development. DEQ shall review the documentation and notify the permittee in writing on the final waiver decision.

3) Each effluent sample shall consist of a minimum 2 liter volume and be collected using either 24 hour manual or automated compositing methods. The sampling protocol shall be submitted to DEQ-NRO for review and approval prior to the first sample collection.

4) The data shall be submitted to DEQ-NRO by the 10th day of the month following receipt of the results. The permittee shall have the option of submitting the results electronically. The submittal shall include the unadjusted and appropriately qualified individual PCB congener analytical results. Additionally, laboratory and field QA/QC documentation and results shall be reported. Total PCBs are to be computed as the summation of the reported, quantified congeners.

k. TMDL Reopener. This special condition is to allow the permit to be reopened if necessary to bring it into compliance with any applicable TMDL that may be developed and approved for the receiving stream.

22. Permit Section Part II. Part II of the permit contains standard conditions that appear in all VPDES Permits. In general, these standard conditions address the responsibilities of the permittee, reporting requirements, testing procedures and records retention.

23. Changes to the Permit from the Previously Issued Permit:

a. Special Conditions:
1) The PCB Monitoring Special Condition has been added.
2) The E3/E4 Special Condition has been removed.
3) A Water Quality Criteria Reopener Special Condition has been added.

b. Monitoring and Effluent Limitations:
1) Annual monitoring for copper has been added.
2) All limitations and monitoring requirements are expressed in two significant figures.
3) Chlorine limitations have been removed since this facility is now using ultraviolet disinfection.
4) Due to all monitoring values being below the permit limit, the monitoring frequency for total recoverable zinc has been changed from once every three months to once every year.

24. Variances/Alternate Limits or Conditions: None

25. Public Notice Information:

First Public Notice Date: Second Public Notice Date:

Public Notice Information is required by 9VAC25-31-280 B. All pertinent information is on file and may be inspected and copied by contacting the: DEQ Northern Regional Office, 13901 Crown Court, Woodbridge, VA 22193; Telephone No. (703) 583-3837; anna.westernik@deq.virginia.gov. See **Attachment 12** for a copy of the public notice document.

Persons may comment in writing or by email to the DEQ on the proposed permit action and may request a public hearing during the comment period. Comments shall include the name, address and telephone number of the writer and of all persons represented by the commenter/requester and shall contain a complete, concise statement of the factual basis for comments. Only those comments received within this period will be considered. The DEQ may decide to hold a public hearing, including another comment period, if public response is significant and there are substantial, disputed issues relevant to the permit. Requests for public hearings shall state: 1) the reason why a hearing is requested; 2) a brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requester, including how and to what extent such interest would be directly and adversely affected by the permit; and 3) specific references, where possible, to terms and conditions of the permit with suggested revisions.

Following the comment period, the Board will make a determination regarding the proposed permit action. This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given. The public may request an electronic copy of the draft permit and fact sheet or review the draft permit and application at the DEQ Northern Regional Office by appointment.

26. 303 (d) Listed Stream Segments and Total Max. Daily Loads (TMDL):
This facility discharges directly to the Rappahannock River. The freshwater tidal Rappahannock, into which all major sewage treatment plants in the Fredericksburg area discharge, is noted with two impairments in the Draft 2012 Water Quality Assessment: bacteria (*E. coli*) and PCBs in fish tissue. This permit has a limit of 126 n/cmL for *E. coli* that requires compliance with the criterion prior to discharge. The bacteria WLA for the Fredericksburg WWTF in the TMDL is 7.83E+12 cfu/year based on a design flow of 4.5 MGD. With this limit in effect, it is unlikely that the facility will contribute to the impairment. Additionally, the permit has a PCB Monitoring Special Condition in support for the PCB TMDL for the tidal Rappahannock River that is scheduled for development by 2016. The bacteria TMDL was approved by EPA on May 5, 2008. There is a completed downstream TMDL for the aquatic life use impairment for the Chesapeake Bay.

27. Additional Comments:

Previous Board Action(s):	Consent Order Issued December 18, 2006; Terminated April 16, 2007 A consent order was issued for operation and maintenance deficiencies, violation of permit limits, and failure of the facility to meet Reliability Class I. Consent Order Issued December 4, 2007; Terminated October 2, 2010 A consent order was issued for violation of numerous permit limits, unpermitted discharge to state waters, failure to meet Reliability Class I, and general maintenance issues. Consent Order Issued August 4, 2011; Terminated November 9, 2011 A consent order was issued for TKN exceedences. Draft Consent Order A consent order is currently being drafted to address a sanitary sewer overflow in the collection system due to a pump failure. See **Attachment 13** (Appendices A of the DEQ Consent Orders Dated December 18, 2006, December 4, 2007, and August 4, 2011).
Staff Comments:	Comments were received on November 5, 2012, from Alli Baird of Virginia DCR regarding the presence of the Yellow Lance, a freshwater mussel, in the area and concerns about the use of chlorine for disinfection. Correspondence in reference to this matter can be found in the permit correspondence file.
Public Comment:	No comments were received during the public notice.
EPA Checklist:	The checklist can be found in **Attachment 14**.

List of Attachments

Attachment 1	Flow Frequency Information
Attachment 2	Facility Schematic/Diagram
Attachment 3	Fredericksburg Quadrangle Map Topographic Map (182C)
Attachment 4	Site Inspection Memorandum
Attachment 5	Planning Statement
Attachment 6	Dissolved Oxygen Water Quality Criteria
Attachment 7	90^{th} Percentile Calculations for pH and Temperature at Monitoring Station 3-RPP104.47
Attachment 8	VIMs Model Summary Dated March 2010
Attachment 9	Water Quality Criteria and Wasteload Allocation Calculations
Attachment 10	Derivation of Toxic Pollutant Limits
Attachment 11	Rappahannock River Freshwater Ammonia as Nitrogen Monitoring Values and Criteria
Attachment 12	Public Notice
Attachment 13	Appendices A of the DEQ Consent Orders Dated December 18, 2006, December 4, 2007, and August 4, 2011
Attachment 14	EPA Checklist

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

MEMORANDUM

Northern Regional Office

TO: File

FROM: Anna Westernik, Water Permit Writer

DATE: March 22, 2012

SUBJECT: Flow Frequencies for the Fredericksburg WWTF (VA0025127)

Flow Frequencies for the Fredericksburg WWTF (VA0025127)

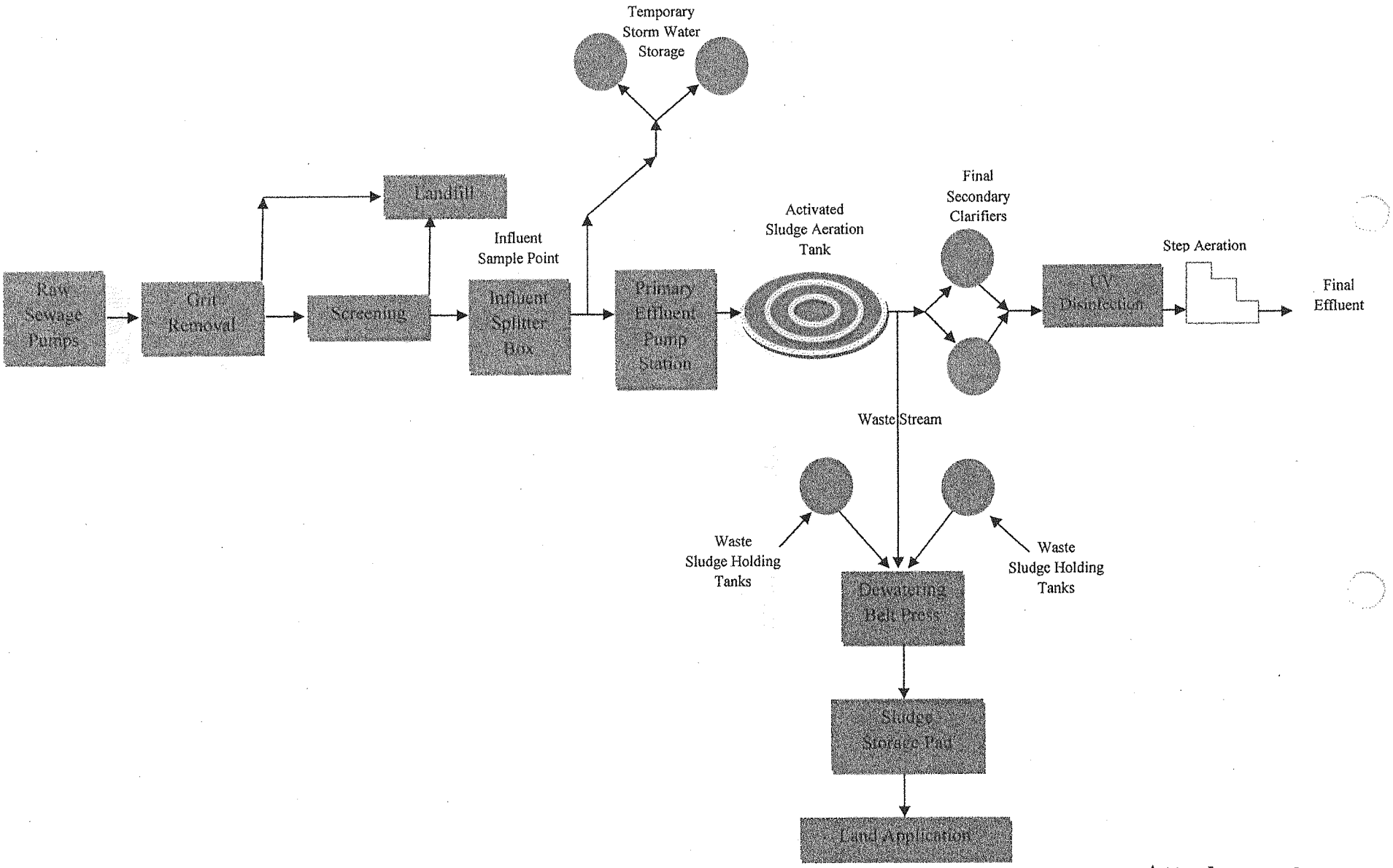
Rappahannock River Near Fredericksburg, VA (Gaging Station #0166800)					
30Q10 High Flow (MGD)	318.7			30Q10 Low Flow (MGD)	50.3
7Q10 High Flow (MGD)	231.6			7Q10 Low Flow (MGD)	29.7
1Q10 High Flow (MGD)	195.5			1Q10 Low Flow (MGD)	24.5
30Q5 (MGD)	80.0			1Q30 Low Flow (MGD)	10.3

Flow frequencies were calculated using data collected at Gaging Station #0166800 during the period of 1907 to 2003.

The high flow months are January through May.

Attachment 1

City of Fredericksburg
Wastewater Treatment Plant
Flow Chart



Attachment 2

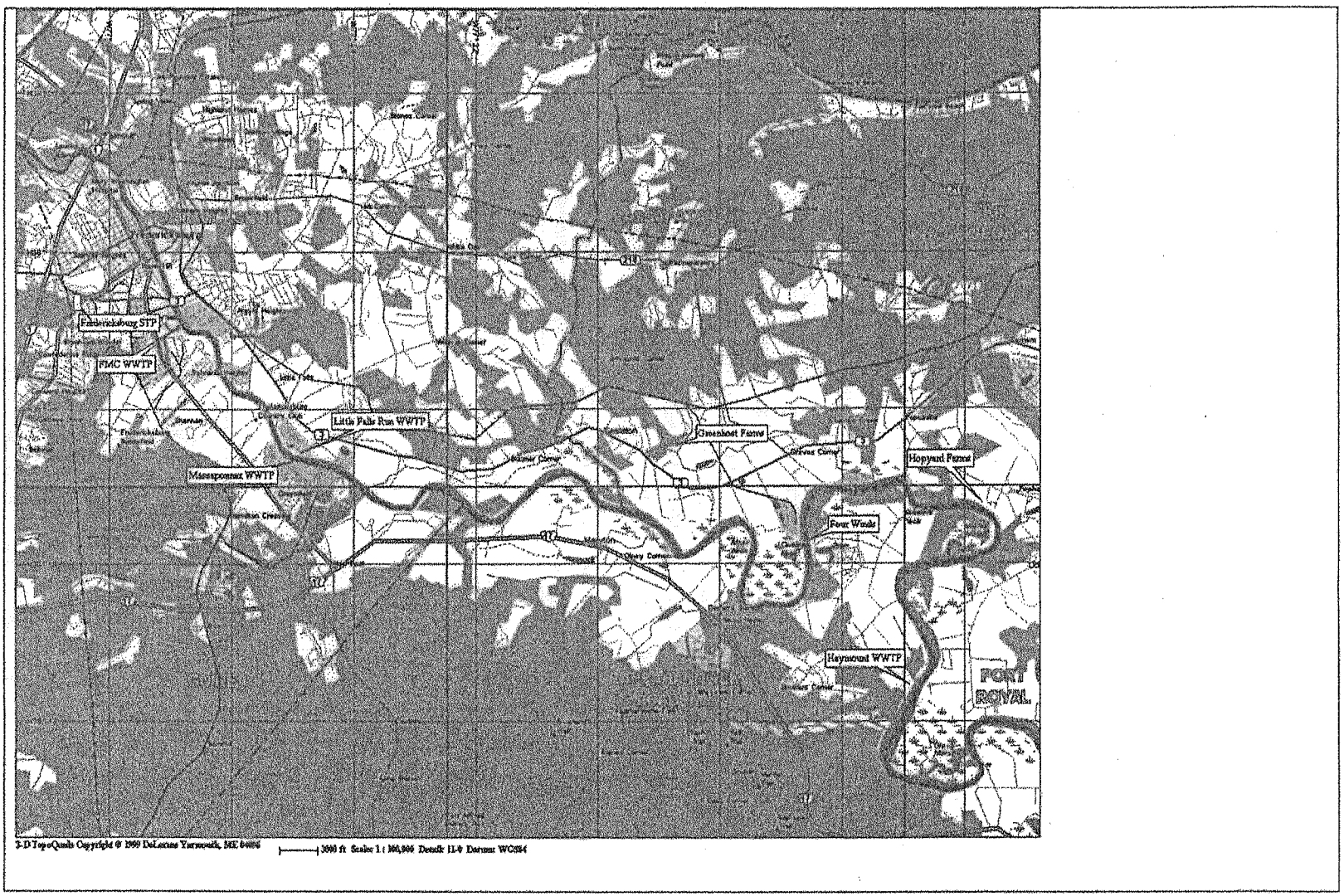


Figure 1
Discharger Locations

Attachment 3

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

MEMORANDUM

Northern Regional Office

TO: File

FROM: Anna Westernik, Water Permit Writer

DATE: May 24, 2012

SUBJECT: May 23, 2012 Site Visit to the Fredericksburg WWTF (VA0025127)

A site visit by Anna Westernik of DEQ was made to the Fredericksburg WWTF for the purpose of permit reissuance. Fredericksburg Wastewater Superintendent, Robert A. Caldwell, conducted the facility tour.

Sewage from the City of Fredericksburg collection system enters the headworks of the Fredericksburg WWTF for treatment or is diverted to the FMC WWTF. Primary treatment consists of bar screens (two mechanical and one manual) and a Cyclone grit collection system. After primary treatment, the effluent is sent to the 3-ring oxidation ditch for secondary treatment via the influent lift station. Influent sampling is conducted prior to the lift station. In the past, two primary clarifiers were used to separate solids before secondary treatment. These are no longer on line—they are only used to hold excess flow during high rain events.

Each of the three channels in the oxidation ditch can be maintained at different dissolved oxygen levels. Each channel is operated so that the oxidation ditch functions in an extended aeration mode. In Channel No.1 (outside channel) most of the oxidation of BOD and ammonia, oxygen uptake, and denitrification occurs. In Channel No.2 (middle channel) dissolved oxygen will vary due to varying loads that enter the plant. Channel No. 2 augments the work of Channel No. 1. Channel No.3 (inside channel) is maintained at a high dissolved oxygen level so that the mixed liquor delivered to the clarifiers has a high residual oxygen. The recommended dissolved oxygen level in the O&M Manual for each channel is as follows:

Channel No.1	0.0 mg/L D.O
Channel No. 2	1.0 mg/L D.O
Channel No. 3	2.0 mg/L D.O

When treating flows well below the plant average design flows of 4.5 MGD, the oxidation ditch can be operated with only Channel No.2 and Channel No. 3 on line. The recommended dissolved oxygen level in the O&M Manual for each channel when operating in this mode is as follows:

Channel No. 2 -	0.5 mg/L D.O.
Channel No. 3 -	2.0 mg/l D.O.

During periods of high flow, Channel No. 1 or Channel No. 2 can be isolated to prevent mixed liquor suspended solids from washing out of the respective channel.

This facility has the capability to add alum, polymer, and caustic soda to the oxidation ditch. Caustic soda increases the pH and maintains alkalinity and thus, maintains the vitality of the microorganisms in the oxidation ditch and increases the efficiency of coagulation agents. Polymer is added to improve settling in the clarifiers without disturbing the flocculation process. Alum may be used to precipitate phosphorus out of solution.

Effluent exiting the oxidation ditch is routed to two secondary clarifiers operating in parallel. Return activated sludge (RAS) is routed from the secondary clarifiers to the oxidation ditch. Waste activated sludge (WAS) is sent to two WAS holding tanks. The sludge from the holding tanks is then thickened, dewatered, and stored under cover on site to be transported for land application. The sludge thickening, dewatering, and land application is operated by Synagro.

The clarified effluent is treated using Trojan ultraviolet (UV) disinfection prior to discharge. The UV disinfection system is compromised of the following major components: four UV Banks, four Power Distribution Centers (PDC), four UV Modules/bank, eight UV lamps/module, one System Control Center (SCC), and one Hydraulic System Center (HSC). On this date, the effluent was being treated at 65% intensity and was clear. There had been significant rainfall the night before.

Sampling is conducted after disinfection and before the cascade aerator – the final treatment process. Effluent flow is measured by an ultrasonic level sensor located at a plant effluent V-notch weir located between the effluent well and the cascade aerator. Discharge is directly to the Rappahannock River.

To:	Anna Westernik
From:	Jennifer Carlson
Date:	March 30, 2012
Subject:	Planning Statement for the Fredericksburg WWTF
Permit No:	VA0025127

Discharge Type:	Municipal
Discharge Flow:	4.5 mgd
Receiving Stream:	Rappahannock River
Latitude / Longitude:	38° 17' 18" N 77° 26' 57" W
Streamcode:	3-RPP
Waterbody:	VAN-E20E
Water Quality Stds:	Class II, Section 1, sp. stds, a
Rivermile:	107.99
Drainage Area:	1632.46 mi^2

1. Is there monitoring data for the receiving stream? Yes.
   - If yes, please attach latest summary.

   This facility discharges into the most upstream segment of the tidal Rappahannock River. The nearest DEQ monitoring station is 3-RPP107.91, which is located approximately 100 yards below the Fredericksburg WWTF. The summary for this segment of the Rappahannock River is below, as taken from the Draft 2012 Integrated Report:

   Class II, Section 1, special stds. a.

   DEQ ambient monitoring stations 3-RPP107.91, one hundred yards below the Fredericksburg Wastewater Treatment Facility, and 3-RPP110.57, at Route 1. The fish consumption use was assessed using DEQ fish tissue/sediment station 3-RPP107.33. Non-agency monitoring station 3RPP-108.39-VIMS.

   The fish consumption use is categorized as impaired due to a Virginia Department of Health, Division of Health Hazards Control, PCB fish consumption advisory and sufficient excursions above the fish tissue value (TV) for PCBs in fish tissue.

   Additionally, excursions above the risk-based tissue screening value (TSV) of 270 parts per billion (ppb) for arsenic (As) in fish tissue was recorded in one species of fish (1 sample) collected in 2006 at monitoring station 3-RPP107.33 (striped bass), noted by an observed effect.

   E. coli monitoring finds a bacterial impairment, resulting in an impaired classification for the recreation use. A bacteria TMDL for this portion of the Rappahannock River was approved by EPA on 05/05/2008.

Attachment 5

The wildlife and aquatic life uses are considered fully supporting. The Chesapeake Bay TMDL was completed in 2010. The shellfishing use was not assessed.

- If no, where is the nearest downstream monitoring station.

2. Is the receiving stream on the current 303(d) list?

Yes, the tidal Rappahannock River is listed with several impairments.

- If yes, what is the impairment?

Recreation Use (*E. coli*) – Sufficient excursions from the maximum *E. coli* bacteria criterion (7 of 43 samples - 16.3%) were recorded at DEQ's ambient water quality monitoring station (3-RPP110.57) at the Route 1 crossing, and at Station 107.91 (4 of 30 samples - 13.3%) to assess this stream segment as not supporting the recreation use for the 2012 water quality assessment.

Fish Consumption Use (PCBs in Fish Tissue) - The fish consumption use is categorized as impaired due to a Virginia Department of Health, Division of Health Hazards Control, PCB fish consumption advisory. The advisory, dated 12/13/04, limits American eel, blue catfish, carp, channel catfish, croaker, gizzard shad, and anadromous (coastal) striped bass consumption to no more than two meals per month. The affected area extends from the I-95 bridge above Fredericksburg downstream to the mouth of the river near Stingray Point, including its tributaries Hazel Run up to the I-95 bridge crossing and Claiborne Run up to the Route 1 bridge crossing. In addition, excursions above the water quality criterion based tissue value (TV) of 20 parts per billion (ppb) for polychlorinated biphenyls (PCBs) in fish tissue were recorded in four species of fish (7 total samples) collected in 2006 at monitoring station 3-RPP107.33 (blueback herring, blue catfish, gizzard shad, striped bass). As a result, the waters were assessed as not supporting the fish consumption use goal for the 2012 water quality assessment.

- Has the TMDL been prepared?

Bacteria TMDL – Yes
PCB TMDL - No

- If yes, what is the WLA for the discharge?

In the Tidal Freshwater Rappahannock River Bacteria TMDL, this facility was assigned a WLA of 7.83E+12 cfu/year for *E. coli*.

- If no, what is the schedule for the TMDL?

The Bacteria TMDL was completed and approved by EPA on 5/5/2008.
The PCB TMDL is scheduled for completion by 2016.

3. If the answer to (2) above is no, is there a downstream 303(d) listed impairment? N/A

- If yes, what is the impairment? N/A

- Has a TMDL been prepared? N/A

- Will the TMDL include the receiving stream? N/A

- Is there a WLA for the discharge? N/A

- What is the schedule for the TMDL? N/A

4. Is there monitoring or other conditions that Planning/Assessment needs in the permit?

   In support for the PCB TMDL that will be developed for the tidal Rappahannock River by 2016, this facility is a candidate for low-level PCB monitoring, based upon its designation as a minor municipal facility. Low-level PCB analysis uses EPA Method 1668B, which is capable of detecting low-level concentrations for all 209 PCB congeners. The Assessment/TMDL Staff recommends that this facility perform low-level PCB monitoring during the upcoming permit cycle. TMDL Guidance Memo No. 09-2001 recommends that major municipal VPDES facilities collect 2 wet and 2 dry samples during the permit cycle, using EPA Method 1668, which is capable of detecting low-level concentrations for all 209 PCB congeners. During the interim period while EPA is undergoing the rulemaking process to promulgate EPA Method 1668C within 40 CFR, rather than requiring the most recent version of 1668 be utilized, Method 1668 revisions A, B, C or other revisions issued by EPA prior to final promulgation are acceptable for use.

   There is a completed downstream TMDL for the aquatic life use impairment for the Chesapeake Bay. However, the Bay TMDL and the WLAs contained within the TMDL are not addressed in this planning statement.

5. Please recalculate the drainage area.

   Calculated drainage area noted above.

6. Please provide information on other VPDES permits or VADEQ monitoring stations located within a 2 mile radius of the facility. In addition, please provide information on any drinking water intakes located within a 5 mile radius of the facility.

   Please see additional document.

Dissolved Oxygen Criteria (9 VAC 25-260-185)

Designated Use	Criteria Concentration/Duration	Temporal Application
Migratory fish spawning and nursery	7-day mean > 6 mg/L (tidal habitats with 0-0.5 ppt salinity)	February 1 – May 31
	Instantaneous minimum > 5 mg/L	
Open-water[1,2]	30-day mean > 5.5 mg/L (tidal habitats with 0-0.5 ppt salinity) 30-day mean > 5 mg/L (tidal habitats with >0.5 ppt salinity)	Year-round
	7-day mean > 4 mg/L	
	Instantaneous minimum > 3.2 mg/L at temperatures < 29°C Instantaneous minimum > 4.3 mg/L at temperatures > 29°C	
Deep-water	30-day mean >3 mg/L	June 1-September 30
	1-day mean > 2.3 mg/L	
	Instantaneous minimum > 1.7 mg/L	
Deep-channel	Instantaneous minimum > 1 mg/L	June 1-September 30

[1]See subsection aa of 9 VAC 25-260-310 for site specific seasonal open-water dissolved oxygen criteria applicable to the tidal Mattaponi and Pamunkey Rivers and their tidal tributaries.

[2]In applying this open-water instantaneous criterion to the Chesapeake Bay and its tidal tributaries where the existing water quality for dissolved oxygen exceeds an instantaneous minimum of 3.2 mg/L, that higher water quality for dissolved oxygen shall be provided antidegradation protection in accordance with section 30 subsection A.2 of the Water Quality Standards.

pH and Temperature Data
3-RPP104.47 Apr 2007 to Dec 2009

Collection Date	Temp (C)	pH (SU)
11-Apr-07	10.7	7.9
6-Jun-07	26.2	7.1
8-Aug-07	30.0	7.0
10-Oct-07	24.7	6.9
11-Dec-07	5.3	7.0
12-Feb-08	4.6	7.0
8-Apr-08	10.8	7.0
10-Jun-08	29.9	7.2
12-Aug-08	26.5	7.6
15-Oct-08	19.9	7.3
18-Dec-08	6.7	7.0
10-Feb-09	5.1	7.1
16-Apr-09	11.8	7.2
16-Jun-09	25.0	7.3
20-Oct-09	11.5	7.1
3-Dec-09	9.0	7.3
90th Percentile	**28.2**	**7.5**
10th Percentile		**7.0**

Attachment 7

March 2010
MEMORANDUM

TO: Virginia Institute of Marine Science (VIMS) Model for the Tidal Rappahannock File

FROM: Alison Thompson, Water Permitting -- NRO

SUBJECT: Virginia Institute of Marine Science Model for the Tidal Rappahannock.
Input Assumptions and Summaries through December 2009

This memo summarizes all of the VIMS model inputs, assumptions, and results made to date, documenting the use of and decisions reached with the model.

The last major update to the inputs to the model was dated January 2005. It was the model run for the expansion of the Little Falls Run STP from 8.0 MGD to 13.0 MGD. In addition, staff made changes to the VIMS point source inputs due to the regulatory initiatives regarding nutrient loadings to the Chesapeake Bay. This analysis accounted for the status of the nutrient regulations in January 2005. In August 2006, staff did a correction to the model for the Fredericksburg STP flow used for the nutrient loadings. The most recent work, and the basis for this memorandum, was done because DEQ received a modification request from Spotsylvania County to move 1.4 MGD flow from FMC to the Massaponax STP.

Background

Stafford County, Spotsylvania County, and the City of Fredericksburg funded a water quality model for the upper Rappahannock River estuary developed by the Virginia Institute of Marine Science (VIMS), entitled A Modeling Study of the Water Quality of the Upper Rappahannock River (VIMS Model). This model was approved by the State Water Control Board Director on December 6, 1991. This model is used to determine effluent limitations for new and expanded discharge requests in the upper Rappahannock River, from the fall line at Fredericksburg to the Rt. 301 Bridge in King George County. VIMS documentation of the model is contained in *A Modeling Study of the Water Quality of the Upper Rappahannock River*, October 1991. A copy of the report as well as the program and general correspondence is contained in the Department of Environmental Quality (DEQ) Northern Regional Office (NRO) Rappahannock Model File.

There are 32 river miles between the fall line and the Rt. 301 Bridge. The model divides this 32 mile segment of the river into 33 model segments (see Figure 1 for discharger locations). The following point source discharges are included in the current model run:

Segment 3:	Fredericksburg STP	VA0025127	4.5 MGD
Segment 4:	FMC WWTP	VA0068110	4.0 MGD
Segment 9:	Little Falls Run STP	VA0076392	13.0 MGD
	Massaponax STP	VA0025658	9.4 MGD
Segment 20:	Four Winds Campground	VA0060429	0.210 MGD
Segment 23:	Hopyard Farm WWTP	VA0089338	0.50 MGD
Segment 26:	Haymount STP	VA0089125	0.96 MGD

Regulations affecting the VIMS model inputs

The 2008 303(d)/305(b) Integrated Report (2008 IR) indicates that the tidal, freshwater portion of the Rappahannock River (which encompasses the entire extent of this model) is impaired for not meeting the aquatic life use due to low levels of dissolved oxygen. Specifically, an open water assessment of dissolved oxygen values during the summer season showed that the tidal, freshwater Rappahannock River (RPPTF) does not meet water quality standards. The total maximum daily load (TMDL) for this impairment is due by 2010, as part of the Chesapeake Bay wide TMDL to address excess nutrients and sediment affecting the Bay.

Attachment 8

In addition, the 2008 IR also listed the tidal, freshwater Rappahannock River as impaired for not meeting the fish consumption use, due to elevated levels of Polychlorinated Biphenyls (PCBs) in fish tissue. The Virginia Department of Health issued a fish consumption advisory for the Rappahannock River below the fall line that limits American eel, blue catfish, carp, channel catfish, croaker, gizzard shad, and anadromous (coastal) striped bass consumption to no more than two meals per month. The affected area extends from the I-95 bridge above Fredericksburg downstream to the mouth of the river near Stingray Point, including its tributaries Hazel Run up to the I-95 bridge crossing and Claiborne Run up to the Route 1 bridge crossing. The TMDL study for this impairment is due by 2016.

Finally, the tidal, freshwater Rappahannock River, from the Route 1 bridge in Fredericksburg, downstream to the confluence with Mill Creek (near the Route 301 bridge crossing) is listed as impaired for not supporting the recreational use due to exceedances of the *E. coli* bacteria criterion. A TMDL was developed for the bacteria impairment in 2007-2008. The TMDL was approved by EPA on 05/05/2008.

As of the drafting of this memo, the preliminary 2010 303(d)/305(b) Integrated Assessment indicates that the open-water aquatic life sub-use (assessed using dissolved oxygen data) for the tidal, freshwater Rappahannock River is fully supporting. There is insufficient information to determine if the aquatic life sub-use for migratory fish spawning and nursery is being met; thus, the overall aquatic life use is also listed as having insufficient information to make an assessment.

Virginia has committed to protecting and restoring the Bay and its tributaries. Currently the Agency has developed nutrient water quality standards for the Bay and its tributaries, amended the Nutrient Policy (9 VAC 25-40-10) to govern the inclusion of technology-based, numerical nitrogen and phosphorus limits in VPDES permits, and a parallel effort updating and amending the Water Quality Management Planning (WQMP) regulation 9 VAC 25-720. The Water Quality Standards for the Bay were adopted in March 2005. The WQMP regulation includes Total Nitrogen and Total Phosphorus Wasteload Allocations for all Chesapeake Bay Program Significant Discharge List (CBP SDL) discharges.

The total phosphorous loadings based on the Nutrient Policy and/or from the WQMP for the applicable facilities are as follows:

Fredericksburg STP (4.5 MGD; 0.3 mg/L)	4,111 lb/year
FMC WWTP (5.4 MGD; 0.3 mg/L)	4,934 lb/year
Little Falls Run STP (8.0 MGD; 0.3 mg/L)	7,309 lb/year
Massaponax STP (8.0 MGD; 0.3 mg/L)	7,309 lb/year
Four Winds Campground (0.21 MGD)	640 lb/year. Not in the WQMP, but must meet 1.0 mg/L annual average
Haymount STP (0.96 MGD; 0.3 mg/L)	877 lb/year
Hopyard Farm WWTP (0.5 MGD; 0.3 mg/L)	457 lb/year

The total nitrogen loadings based on the Nutrient Policy and from the WQMP for the applicable facilities are as follows:

Fredericksburg STP (4.5 MGD; 4.0 mg/L)	54,819 lb/year
FMC WWTP (5.4 MGD; 4.0 mg/L)	65,784 lb/year
Little Falls Run STP (8.0 MGD; 4.0 mg/L)	97,458 lb/year
Massaponax STP (8.0 MGD; 4.0 mg/L)	97,458 lb/year
Four Winds Campground (0.21 MGD)	5100 lb/year. Not in the WQMP, but must meet 8.0 mg/L annual average
Haymount STP (0.96 MGD; 4.0 mg/L)	11,695 lb/year

Hopyard Farm WWTP (0.5 MGD; 4.0 mg/L) 6091 lb/year.

In addition to the nutrient initiatives, the changes to the Water Quality Standards for the Chesapeake Bay and tidal waters included criteria for dissolved oxygen, water clarity, chlorophyll a, and Designated Uses. The dissolved oxygen standard for migratory fish waters for the months of February through May is a 7-day mean of greater than of 6.0 mg/L. For the months of June through January, the minimum is 5.5 mg/L. These dissolved oxygen criteria apply to the upper tidal portion of the Rappahannock River.

RADCO 208 Plan

The Rappahannock Area Development Commission (RADCO) 208 Area Waste Treatment Management Plan was adopted in August 1977, was amended in September 1983, and was repealed in 2004. The loading allocations in it had to be maintained until the Plan was repealed. The loading allocations in the Plan were based on an old water quality model, AUTO$$, that was replaced in 1991 by the VIMS model.

The VIMS model has demonstrated that nutrients are the primary factor affecting water quality in the upper tidal Rappahannock River. Numerous runs of the model have demonstrated that cBOD is not as influential as the nutrients at the maximum permitted flows of each POTW. As such, cBOD loadings are permissible above the levels specified in the old RADCO Plan.

Model Timeline

To date the model has been run seven times, each being necessitated by a request for a flow increase or for a new discharge. The runs are as follows:

1. August 14, 1995
   - expansion of Fredericksburg STP from 3.5 to 4.5 MGD
   - addition of 0.93 MGD Haymount STP in Caroline County
2. August 22, 1996
   - addition of 0.25 MGD Hopyard Farm WWTP in King George County
3. March 17, 1997
   - flow increase and production increase at White Packing
4. April 7, 1999
   - expansion of Little Falls Run STP from 4.0 to 8.0 MGD
   - expansion of Massaponax STP from 6.0 to 8.0 MGD
5. December 1, 2000
   - expansion of FMC WWTP from 4.0 to 5.4 MGD
6. April 29, 2003
   - expansion of the proposed Hopyard Farm WWTP from 0.25 to 0.50 MGD.
7. January 26, 2005
   -remove White Packing from Segment 26 since the facility is closed
   -correction of Haymount STP flow to 0.96 (previously was 0.93)
   -addition of 1.0-MGD Greenhost – Village Farms in King George County
   -expansion of Little Falls Run STP from 8.0 to 13.0 MGD
   -incorporation of the WQMP nutrient loadings for the Significant Dischargers
8. August 2006
   - correct nutrient loadings for the City of Fredericksburg
9. December 2009
   - shift 1.4 MGD flow from FMC to Massaponax (will now be 9.4 MGD)
   - change the distribution of the nitrogen species based on the data obtained from the Discharge Monitoring Reports.

The initial run on August 14, 1995, has been considered the background condition for the river segments. The VIMS files located at DEQ-NRO contain the supporting documentation for the original model inputs and the subsequent model runs. With each successive run of the model, all parameters had been kept constant except those affected by the request necessitating the model run. The most recent model runs affected a change to the nutrient loadings for all the dischargers. In the older model runs, staff used best professional judgment to determine the distribution of the three nitrogen species: Ammonia as Nitrogen, Total Kjeldahl Nitrogen, and Oxidized Nitrogen (Nitrate+Nitrite). The January 2010 run looked at actual performance data

from the four largest facilities and found that the old assumptions were not correct. The old assumptions were Ammonia as Nitrogen (25%), Total Kjeldahl Nitrogen (25%), and Oxidized Nitrogen (50%). The actual performance data from these larger facilities is Ammonia as Nitrogen (3%), Total Kjeldahl Nitrogen (37%), and Oxidized Nitrogen (60%).

Antidegradation Analysis

With each running of the model, and/or permit action concerning this section of the Rappahannock River, an antidegradation analysis has been conducted in accordance with the water quality standards and DEQ guidance. This is a difficult task since the assessment and designation of Tier I or Tier II waters is partially subjective given the narrative criteria of the standards, water quality data are not static, and waterbody boundaries are not well defined.

Since the onset of using this model, the established model segments have been used, by default, to define river sections into individual waterbodies for the antidegradation analysis. DEQ did not suggest or contend that these model segments should be used for other water quality management purposes. It was recognized that the river from the fall line down to the Rt. 301 Bridge could have been, and perhaps should have been, considered one waterbody segment. DEQ also acknowledged that this whole segment of the Rappahannock River could have been assessed as Tier I since it is considered nutrient enriched and turbid and therefore subject to corrective plans outlined in the *1999 Tributary Strategy for the Rappahannock River and Northern Neck Coastal Basins*. However, being uncertain DEQ elected to evaluate antidegradation, as through each of the model segments were actual distinct waterbodies. This approach was conservative in terms of protecting water quality and to date did not prove to be an undo burden to any of the dischargers.

Historically, four segments were identified as Tier II through this process: segment 16, segment 20, segment 23, and segment 26. Each was identified through separate permit actions that did not initially involve the VIMS model. When a segment was analyzed as Tier II, two parameters generally were assessed, ammonia and dissolved oxygen (DO). Ammonia levels were kept below the baselines and DO was kept to no lower than 0.2 mg/L of the concentration predicted in the August 14, 1995 background model run. The VIMS memo dated April 29, 2003 contains the historical summary and table of the baselines of the Tier determinations for each of the four segments.

During the January 2005 model run analysis, the entire Rappahannock River was determined to be Tier I. The previous determination of Tier II ratings for segments 16, 20, 23, and 26 were made with adherence to guidance with little best professional judgement by staff. It has been 10 years since the initial runs of the model and staff no longer believes it appropriate to assign a tier rating for each model segment. Staff believes it is best to rate the whole segment from the fall line to the Route 301 bridge as one segment. The nutrient enrichment problems of this segment, as evident by high turbidity, warrant a Tier I rating. Staff again makes this determination for the sole purpose of assigning permit limits. And since the Tier ratings have had very little influence on the results of the model, there is no measurable consequence to this change, and there is no need to continue to assess these segments (16, 20, 23, and 26) as being different from the whole river segment.

It should be noted that the predicted concentrations of dissolved oxygen and ammonia are significantly different in this current model run than what was considered the "background" concentrations. With the new loading allocations to the significant discharges in place, the model predicts that chlorophyll concentrations will be significantly less than what prior model runs have predicted and the artificially elevated levels of dissolved oxygen (nutrients stimulate chlorophyll growth and chlorophyll photosynthesis generates dissolved oxygen) are no longer predicted. Further discussion of chlorophyll a is found in the next section.

Total Phosphorus Loading Cap (historical perspective)

All of the above facilities discharge into the tidal freshwater Rappahannock River. This section of the river was formerly designated as nutrient enriched waters. Specifically, the Tidal freshwater Rappahannock River from the fall line to Buoy 44 near Leedstown, Virginia, including all tributaries to their headwaters that enter the tidal freshwater Rappahannock River were classified as nutrient enriched waters. All dischargers into nutrient enriched waters as designated in the Water Quality Standards for Nutrient Enriched Waters that were permitted before July 1, 1988, and that discharge 1 MGD or more were subject to the Policy for Nutrient Enriched Waters. This policy required facilities to meet a monthly average Total Phosphorus limitations of 2.0 mg/L and to monitor for monthly average Total Nitrogen concentration and loading values. The application of standards to protect nutrient enriched waters within the Chesapeake Bay watershed was replaced in Virginia by the aforementioned regulatory programs governing nutrient and sediment inputs into the Bay. Thus, the nutrient enriched waters designation was removed from the Water Quality Standards.

Based on the prior VIMS model runs, the chlorophyll a levels in the upper segments of the river in the Fredericksburg area approached 100 ug/L under design conditions. It is staff's best professional judgment that high chlorophyll a concentrations and the corresponding high alga growth mask dissolved oxygen depletion due to BOD loading. The model provides a 30-day average output and it is hypothesized that the elevating effect of the chlorophyll concentrations is more significant than the

depleting effect of the BOD loadings. If the model provided daily outputs, one could see the diurnal dissolved oxygen sag and super-saturation effects in an over-enriched system. Further, the model demonstrated that chlorophyll a concentrations increased with additional phosphorus (P) loadings. If P limits for the expanding STPs were based solely on the Nutrient Policy, 2 mg/L, then chlorophyll a levels would exceed 120 ug/L in the waters around the City of Fredericksburg. To prevent further increases in chlorophyll a concentrations in this part of the river, total phosphorus loadings (mass based, kg/day) were not allowed to increase for the Fredericksburg, FMC, Massaponax, and Little Falls Run wastewater treatment plants beyond the current limits. All future requests for flow increases at these facilities required that the P mass limits remain constant at the current loading limits. Permitted phosphorus concentration limits may remain at the same level prescribed by the Nutrient Policy, 2 mg/L, since it is the total mass loading that impacts chlorophyll levels. However, as effluent flows increase, in order to meet the mass limitations, effluent concentrations had to be below the 2 mg/L limit.

The relationship of how chlorophyll photosynthesis affects dissolved oxygen levels has been explored in this model and it was worth recognizing what historical baseline/initial levels were. These values were useful in the subsequent model runs for tracking how nutrients inflated dissolved oxygen levels (nutrients stimulate chlorophyll growth and chlorophyll photosynthesis generates dissolved oxygen).

DEQ has adopted a chlorophyll a narrative standard at 9VAC25-260-185 that states, "Concentrations of chlorophyll a in free-floating microscopic aquatic plants (algae) shall not exceed levels that result in undesirable or nuisance aquatic plant life, or render tidal waters unsuitable for the propagation and growth of a balanced, indigenous population of aquatic life or otherwise result in ecologically undesirable water quality conditions such as reduced water clarity, low dissolved oxygen, food supply imbalances, proliferation of species deemed potentially harmful to aquatic life or humans or aesthetically objectionable conditions."

Summary of past model runs

In the 1995 VIMS model, the winter inputs for ammonia and organic nitrogen for all wastewater treatment plants were 14 mg/L ammonia and 14 mg/L organic nitrogen. These values represented little to no nitrification. The model indicated that there were no far field violations of the winter ammonia standards. Therefore, no winter ammonia or TKN limits were established for Fredericksburg, FMC, Massaponax, and Little Falls Run wastewater treatment plants. The acute ammonia criterion for the winter months was 12.07 mg/L. DEQ did not impose winter acute based ammonia limits on any of the treatment plants for the following reasons: the discharges are located near the fall line where tidal influences are the smallest; the net advective flow of the river dominates the tidal influence; the design flows are much smaller than the critical flows of the river; ammonia decays rather rapidly; and each of the plants were achieving varying degrees of nitrification.

During the April 7, 1999 model run, winter ammonia loading had to be lowered for Little Falls Run and Massaponax from 14 mg/L to 12 mg/L in order to meet the antidegradation baselines in segment 23 and 26. Since organic nitrogen would also decrease during the nitrification process, its input into the model was also lowered to 12 mg/L for both dischargers. During this model run, the winter ammonia loadings for FMC were also lowered to 12 mg/L to meet the antidegradation baselines of segments 16, 23, and 26. At the new flows for FMC, water quality criteria and antidegradation baselines are still protective for the summer months of May – October. Since organic nitrogen would also decrease during the nitrification process, its input into the model was also lowered to 12 mg/L for FMC. Acute based ammonia limits were imposed at the new flows for the same reasons cited above. However, since the new model inputs were lower than the acute ammonia water quality standard of 12.07 mg/L, it was certain that the acute standard was protected in the winter.

In the December 1, 2000 model run, two minor data entry problems were corrected in conjunction with the expansion of FMC to 5.4 MGD. First, in the original model documentation memorandum of August 14, 1995, the assumption was made that total effluent nitrogen levels for these types of plants would be 30 mg/L, and that it would exist in the form of organic nitrogen, ammonia, and/or inorganic nitrogen depending on the facility's ability to nitrify. This can be seen on page 1 under the section "Assumptions for nitrogen". However, the value shown for the three separate nitrogen parts add up to 32 mg/L. It was felt that this was a simple oversight at the time. Additionally, during the April 7, 1999 model run, nitrate-nitrite levels were increased to 21 mg/L and 24 mg/L for the Little Falls Run and Massaponax dischargers respectively, even though the ammonia nitrogen levels were set at 12 mg/L. Therefore, in order to maintain the original model assumptions, winter nitrate input levels were reset to 6 mg/L during this run for Little Falls Run, Massaponax, and FMC. Since the Fredericksburg inputs had not been adjusted, nor had they recently been adjusted, the original values were maintained (14 mg/L organic-N, 14 mg/L Ammonia-N, and 4 mg/L Nitrate/Nitrite). Second, the ammonia loadings for the Haymount STP were incorrectly entered as 8.61 kg/d. The correct loading was entered as 3.53 kg/d. This correction had little to no impact on the model outputs.

In the April 29, 2003, model run all numerical criteria were met and all antidegradation baselines for ammonia and DO were met except for one. In the winter run, segment 23 (Hopyard Farm) yielded a DO of 7.43 mg/L. The baseline for DO in this segment is 7.47 mg/L. In order to maintain the additional 0.04 mg/L of DO, the BOD concentrations of Hopyard Farm and the upstream dischargers would have to be significantly reduced. DEQ did not believe this reduction was warranted since the model was run based on design capacity flows for all facilities and not just for Hopyard Farm. In addition, the DO deficit for segment 23 actually improved from 0.07 mg/L to 0.04 mg/L with the increase in Hopyard Farm's flows. Therefore, changes to the effluent limits were not necessary for such a small change in DO since the model is not that sensitive or accurate.

In January 2005, the model run was conducted to include the expansion of the Little Falls Run STP, the removal of White Packing, the correction of the Haymount STP flow, and the addition of Greenhost – Village Farms because of observed nutrient concentrations in the discharge. This model run also assumed that the Nutrient Policy and the WQMP regulation were adopted. Effluent loadings for $cBOD_5$ and Dissolved Oxygen were derived by multiplying the current concentration limits by the maximum permitted flow. For the facilities that are contained in the draft WQMP regulation, nutrient loadings were derived using the flows and loadings presented in draft regulation. For Four Winds Campground, nutrient loadings were derived using a total nitrogen concentration of 8.0 mg/L and a total phosphorus concentration of 1.0 mg/L based on the draft Nutrient Policy. For Hopyard Farm WWTP, nutrient loadings were derived using a total nitrogen concentration of 4.0 mg/L and a total phosphorus concentration of 0.3 mg/L based on what was the draft WQMP. Best professional judgement and actual effluent data were used to determine the loadings for Greenhost- Village Farms. There was a small excursion of the Migratory fish spawning an nursery dissolved oxygen concentration of $\geq$6 mg/L; the excursion was 5.6 mg/L. Staff did not change the BOD limits for the dischargers but recommended increased ambient monitoring of the upper tidal Rappahannock River.

Current Model Run Summary

The model was run for the summer (May- October) period because this is the most critical time and when potential dissolved oxygen excursions have been noted during past model analyses. Historically, no problems have been noted with chlorophyll or dissolved oxygen in the winter runs. It should be noted that before the model runs could be fully analyzed and other scenarios attempted, the computer that this model runs on began to fail. The older programming (Leahy Fortran) used for the VIMS model no longer runs on the newer computers. Therefore, additional modeling cannot be performed without updating the code of the VIMS model.

Summer continues to be the critical period for the water quality of the upper tidal freshwater Rappahannock River because stream flows are typically lower and the dischargers have a greater influence on the water quality in the river, and alga growth is higher during the warmer temperatures of the summer months.

Staff ran a baseline run for the summer with Massaponax at 8 MGD; the baseline run did have the nitrogen allocations changed to reflect actual effluent characteristics, as discussed above. Model runs were also done with Massaponax at 9.4 MGD, Massaponax at 9.4 MGD and all facilities meeting the WQMP conditions, all FMC flow moved to Massaponax, and all flow from FMC and the City of Fredericksburg moved to Massaponax.

Chlorophyll a & Nutrients

When the WQMP is fully implemented, the model predicts chlorophyll a levels to drop substantially even when all the dischargers are at full capacity. The WQMP essentially reduces and places total nitrogen and total phosphorus loading caps on the significant dischargers. By removing the WWTP nutrient food sources for the algae, alga populations fall and thus, chlorophyll a levels are reduced. As noted earlier in this memorandum, staff also reallocated the nitrogen species based on the performance of the upgraded facilities. This also changed the output predictions from former analyses. It is staff's best professional judgment that moving the 1.4 MGD flow from FMC to Massaponax will not have any negative effects on the chlorophyll a and nutrient concentrations in the River.

Dissolved Oxygen

Class II tidal waters in the Chesapeake Bay and it tidal tributaries must meet dissolved oxygen concentrations as specified in 9VAC25-260-185. In the Northern Virginia area, Class II waters must meet the Migratory Fish Spawning and Nursery Designated Use from February 1 through May 31. For the remainder of the year, these tidal waters must meet the Open Water use.

Designated Use	Criteria Concentration/Duration	Temporal Application
Migratory fish spawning and nursery	7-day mean > 6 mg/L (tidal habitats with 0-0.5 ppt salinity)	February 1 – May 31
	Instantaneous minimum > 5 mg/L	
Open-water[1,2]	30-day mean > 5.5 mg/L (tidal habitats with 0-0.5 ppt salinity) 30-day mean > 5 mg/L (tidal habitats with >0.5 ppt salinity)	Year-round
	7-day mean > 4 mg/L	
	Instantaneous minimum > 3.2 mg/L at temperatures < 29°C Instantaneous minimum > 4.3 mg/L at temperatures > 29°C	
	1-day mean > 2.3 mg/L	
	Instantaneous minimum > 1.7 mg/L	

[1]See subsection aa of 9 VAC 25-260-310 for site specific seasonal open-water dissolved oxygen criteria applicable to the tidal Mattaponi and Pamunkey Rivers and their tidal tributaries.

[2]In applying this open-water instantaneous criterion to the Chesapeake Bay and its tidal tributaries where the existing water quality for dissolved oxygen exceeds an instantaneous minimum of 3.2 mg/L, that higher water quality for dissolved oxygen shall be provided antidegradation protection in accordance with section 30 subsection A.2 of the Water Quality Standards.

The model results show protection of the dissolved oxygen criteria except for the month of May in several segments. The current temporal application of the dissolved oxygen standards is different than the temporal application of the model, i.e., May is classified in the summer period. The migratory fish spawning and nursery Designated Use also looks at a 7-day mean, but the model only has a 30-day output. At this time, staff does not feel any changes are necessary to the cBOD limits for the dischargers because:

1) The excursion is very small; 5.6 mg/L is the predicted concentration in segment 13 when the Massaponax flow is at 9.4 and all facilities are at the WQMP loadings and concentrations.
2) The model is not that accurate to warrant substantial changes to the STPs to achieve such a small difference in dissolved oxygen. The accuracy of the model is questionable since it was developed over 20 years ago.
3) The model assumes May to be like July, August, and September, when in fact it is not, i.e., the water temperature is cooler and the background flows are higher.

VIMS Model

Due to the age of the model and the development and changes that have occurred in the localities, staff will also inform the localities that any additional changes to design flows will require an update to the VIMS model. Staff recommends that the following be considered when the model is updated:

1) The model currently provides only a 30-day average output. It would be useful to have the ability to generate hourly, daily or other shorter averaging periods. A more refined model will allow better understanding of the relationships between DO, chlorophyll a, BOD, and nutrients.
2) Consider land use and hydrologic changes that have occurred and the associated changes to water flow, quantity and quality dynamics, especially since the Embry Dam has been removed from the River.

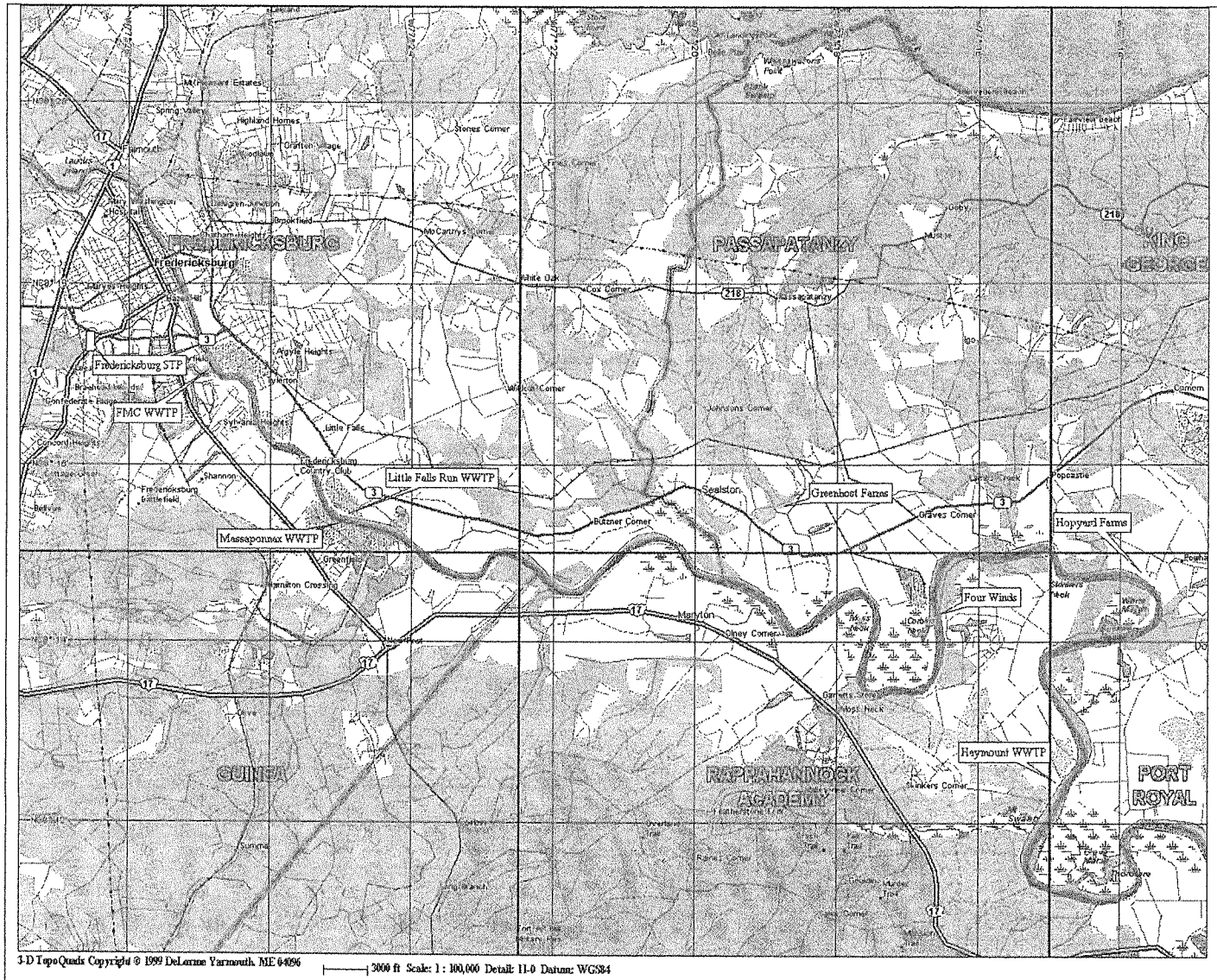


Figure 1
Discharger Locations

Table 1
Current Model Associated Limits for All Dischargers in VIMS Model

Discharger Permit No.	Fredericksburg VA0025127	FMC VA0068110	Little Falls Run VA0076392	Massaponax VA0025658	Four Winds VA0060429	Hopyard Farm VA0089338	Haymount VA0089125
Segment	3	4	9	9	20	23	26
River Mile	108.64	107.37	104.61	104.67	92.2	89.8	85.10
Flow (MGD)	4.5	5.4	13.0	9.4	0.210	0.50	0.96
BOD5 (mg/L, kg/d)	N/A	N/A	N/A	N/A	30/23.8	30/56.77	N/A
cBOD5 (mg/L, kg/d)	13.0 / 221	15.0 / 306.6	9.0 /440	10.0 / 356	N/A	N/A	10.0 / 36
TKN (summer) (mg/L, kg/d)	7.0 /119.23	3.0 / 61.3	6.0 /295	9.0 / 320	2.29/1.82	N/A	3.0 / 10.9
TKN (winter) (mg/L, kg/d)	NL	N/A	NL	NL	3.41/2.71	N/A	N/A
Ammonia (summer) (mg/L, kg/d)	N/A	N/A	4.7	N/A	N/A	10.7/20.2	N/A
Ammonia (winter) (mg/L, kg/d)	N/A	N/A	4.7	12.0 / 427	N/A	12.4/23.4	N/A
Total Phosphorous (kg/d)	26.5	30.3	30.3	45.4	1.59	3.78	7.3
Dissolved Oxygen (mg/L)	6.0	6.0	6.0	6.0	6.0	6.0	6.0

N/A – Not Applicable
NL – No Limit

Attachment 9

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Fredericksburg WWTP Permit No.: VA0025127

Receiving Stream: Rappahannock River Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =	50 mg/L
90% Temperature (Annual) =	26 deg C
90% Temperature (Wet season) =	15 deg C
90% Maximum pH =	7.5 SU
10% Maximum pH =	SU
Tier Designation (1 or 2) =	1
Public Water Supply (PWS) Y/N? =	n
Trout Present Y/N? =	n
Early Life Stages Present Y/N? =	y

Stream Flows

1Q10 (Annual) =	1 MGD
7Q10 (Annual) =	1 MGD
30Q10 (Annual) =	1 MGD
1Q10 (Wet season) =	1 MGD
30Q10 (Wet season)	1 MGD
30Q5 =	1 MGD
Harmonic Mean =	1 MGD

Mixing Information

Annual - 1Q10 Mix =	100 %
- 7Q10 Mix =	100 %
- 30Q10 Mix =	100 %
Wet Season - 1Q10 Mix =	100 %
- 30Q10 Mix =	100 %

Effluent Information

Mean Hardness (as CaCO3) =	50 mg/L
90% Temp (Annual) =	26 deg C
90% Temp (Wet season) =	15 deg C
90% Maximum pH =	7.5 SU
10% Maximum pH =	SU
Discharge Flow =	1 MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Acenapthene	0	--	--	na	9.9E+02	--	--	na	2.0E+03	--	--	--	--	--	--	--	--	--	--	na	2.0E
Acrolein	0	--	--	na	9.3E+00	--	--	na	1.9E+01	--	--	--	--	--	--	--	--	--	--	na	1.9E
Acrylonitrile [C]	0	--	--	na	2.5E+00	--	--	na	5.0E+00	--	--	--	--	--	--	--	--	--	--	na	5.0E
Aldrin [C]	0	3.0E+00	--	na	5.0E-04	6.0E+00	--	na	1.0E-03	--	--	--	--	--	--	--	--	6.0E+00	--	na	1.0E
Ammonia-N (mg/l) (Yearly)	0	1.99E+01	2.08E+00	na	--	3.98E+01	4.16E+00	na	--	--	--	--	--	--	--	--	--	3.98E+01	4.16E+00	na	--
Ammonia-N (mg/l) (High Flow)	0	1.99E+01	4.23E+00	na	--	3.98E+01	8.46E+00	na	--	--	--	--	--	--	--	--	--	3.98E+01	8.46E+00	na	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	8.0E+04	--	--	--	--	--	--	--	--	--	--	na	8.0E
Antimony	0	--	--	na	6.4E+02	--	--	na	1.3E+03	--	--	--	--	--	--	--	--	--	--	na	1.3E
Arsenic	0	3.4E+02	1.5E+02	na	--	6.8E+02	3.0E+02	na	--	--	--	--	--	--	--	--	--	6.8E+02	3.0E+02	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Benzene [C]	0	--	--	na	5.1E+02	--	--	na	1.0E+03	--	--	--	--	--	--	--	--	--	--	na	1.0E
Benzidine [C]	0	--	--	na	2.0E-03	--	--	na	4.0E-03	--	--	--	--	--	--	--	--	--	--	na	4.0E
Benzo (a) anthracene [C]	0	--	--	na	1.8E-01	--	--	na	3.6E-01	--	--	--	--	--	--	--	--	--	--	na	3.6E
Benzo (b) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	3.6E-01	--	--	--	--	--	--	--	--	--	--	na	3.6E
Benzo (k) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	3.6E-01	--	--	--	--	--	--	--	--	--	--	na	3.6E
Benzo (a) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	3.6E-01	--	--	--	--	--	--	--	--	--	--	na	3.6E
Bis2-Chloroethyl Ether [C]	0	--	--	na	5.3E+00	--	--	na	1.1E+01	--	--	--	--	--	--	--	--	--	--	na	1.1E
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	1.3E+05	--	--	--	--	--	--	--	--	--	--	na	1.3E
Bis 2-Ethylhexyl Phthalate [C]	0	--	--	na	2.2E+01	--	--	na	4.4E+01	--	--	--	--	--	--	--	--	--	--	na	4.4E
Bromoform [C]	0	--	--	na	1.4E+03	--	--	na	2.8E+03	--	--	--	--	--	--	--	--	--	--	na	2.8E
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	3.8E+03	--	--	--	--	--	--	--	--	--	--	na	3.8E
Cadmium	0	1.8E+00	6.6E-01	na	--	3.6E+00	1.3E+00	na	--	--	--	--	--	--	--	--	--	3.6E+00	1.3E+00	na	--
Carbon Tetrachloride [C]	0	--	--	na	1.6E+01	--	--	na	3.2E+01	--	--	--	--	--	--	--	--	--	--	na	3.2E
Chlordane [C]	0	2.4E+00	4.3E-03	na	8.1E-03	4.8E+00	8.6E-03	na	1.6E-02	--	--	--	--	--	--	--	--	4.8E+00	8.6E-03	na	1.6E
Chloride	0	8.6E+05	2.3E+05	na	--	1.7E+06	4.6E+05	na	--	--	--	--	--	--	--	--	--	1.7E+06	4.6E+05	na	--
TRC	0	1.9E+01	1.1E+01	na	--	3.8E+01	2.2E+01	na	--	--	--	--	--	--	--	--	--	3.8E+01	2.2E+01	na	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	3.2E+03	--	--	--	--	--	--	--	--	--	--	na	3.2E+

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	2.6E+02	--	--	--	--	--	--	--	--	--	--	na	2.6E+02
Chloroform	0	--	--	na	1.1E+04	--	--	na	2.2E+04	--	--	--	--	--	--	--	--	--	--	na	2.2E+04
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	3.2E+03	--	--	--	--	--	--	--	--	--	--	na	3.2E+03
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	3.0E+02	--	--	--	--	--	--	--	--	--	--	na	3.0E+02
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	1.7E-01	8.2E-02	na	--	--	--	--	--	--	--	--	--	1.7E-01	8.2E-02	na	--
Chromium III	0	3.2E+02	4.2E+01	na	--	6.5E+02	8.4E+01	na	--	--	--	--	--	--	--	--	--	6.5E+02	8.4E+01	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	3.2E+01	2.2E+01	na	--	--	--	--	--	--	--	--	--	3.2E+01	2.2E+01	na	--
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Chrysene[C]	0	--	--	na	1.8E-02	--	--	na	3.6E-02	--	--	--	--	--	--	--	--	--	--	na	3.6E-02
Copper	0	7.0E+00	5.0E+00	na	--	1.4E+01	9.9E+00	na	--	--	--	--	--	--	--	--	--	1.4E+01	9.9E+00	na	--
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	4.4E+01	1.0E+01	na	3.2E+04	--	--	--	--	--	--	--	--	4.4E+01	1.0E+01	na	3.2E+04
DDD[C]	0	--	--	na	3.1E-03	--	--	na	6.2E-03	--	--	--	--	--	--	--	--	--	--	na	6.2E-03
DDE[C]	0	--	--	na	2.2E-03	--	--	na	4.4E-03	--	--	--	--	--	--	--	--	--	--	na	4.4E-03
DDT[C]	0	1.1E+00	1.0E-03	na	2.2E-03	2.2E+00	2.0E-03	na	4.4E-03	--	--	--	--	--	--	--	--	2.2E+00	2.0E-03	na	4.4E-03
Demeton	0	--	1.0E-01	na	--	--	2.0E-01	na	--	--	--	--	--	--	--	--	--	--	2.0E-01	na	--
Diazinon	0	1.7E-01	1.7E-01	na	--	3.4E-01	3.4E-01	na	--	--	--	--	--	--	--	--	--	3.4E-01	3.4E-01	na	--
Dibenz(a,h)anthracene[C]	0	--	--	na	1.8E-01	--	--	na	3.6E-01	--	--	--	--	--	--	--	--	--	--	na	3.6E-01
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	2.6E+03	--	--	--	--	--	--	--	--	--	--	na	2.6E+03
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	1.9E+03	--	--	--	--	--	--	--	--	--	--	na	1.9E+03
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	3.8E+02	--	--	--	--	--	--	--	--	--	--	na	3.8E+02
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	5.6E-01	--	--	--	--	--	--	--	--	--	--	na	5.6E-01
Dichlorobromomethane[C]	0	--	--	na	1.7E+02	--	--	na	3.4E+02	--	--	--	--	--	--	--	--	--	--	na	3.4E+02
1,2-Dichloroethane[C]	0	--	--	na	3.7E+02	--	--	na	7.4E+02	--	--	--	--	--	--	--	--	--	--	na	7.4E+02
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	1.4E+04	--	--	--	--	--	--	--	--	--	--	na	1.4E+04
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	2.0E+04	--	--	--	--	--	--	--	--	--	--	na	2.0E+04
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	5.8E+02	--	--	--	--	--	--	--	--	--	--	na	5.8E+02
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	3.0E+02	--	--	--	--	--	--	--	--	--	--	na	3.0E+02
1,3-Dichloropropene[C]	0	--	--	na	2.1E+02	--	--	na	4.2E+02	--	--	--	--	--	--	--	--	--	--	na	4.2E+02
Dieldrin[C]	0	2.4E-01	5.6E-02	na	5.4E-04	4.8E-01	1.1E-01	na	1.1E-03	--	--	--	--	--	--	--	--	4.8E-01	1.1E-01	na	1.1E-03
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	8.8E+04	--	--	--	--	--	--	--	--	--	--	na	8.8E+04
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	1.7E+03	--	--	--	--	--	--	--	--	--	--	na	1.7E+03
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	2.2E+06	--	--	--	--	--	--	--	--	--	--	na	2.2E+06
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	9.0E+03	--	--	--	--	--	--	--	--	--	--	na	9.0E+03
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	1.1E+04	--	--	--	--	--	--	--	--	--	--	na	1.1E+04
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	5.6E+02	--	--	--	--	--	--	--	--	--	--	na	5.6E+02
2,4-Dinitrotoluene[C]	0	--	--	na	3.4E+01	--	--	na	6.8E+01	--	--	--	--	--	--	--	--	--	--	na	6.8E+01
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	1.0E-07	--	--	--	--	--	--	--	--	--	--	na	1.0E-07
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	4.0E+00	--	--	--	--	--	--	--	--	--	--	na	4.0E+00
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	4.4E-01	1.1E-01	na	1.8E+02	--	--	--	--	--	--	--	--	4.4E-01	1.1E-01	na	1.8E+02
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	4.4E-01	1.1E-01	na	1.8E+02	--	--	--	--	--	--	--	--	4.4E-01	1.1E-01	na	1.8E+02
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	4.4E-01	1.1E-01	--	--	--	--	--	--	--	--	--	--	4.4E-01	1.1E-01	--	--
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	1.8E+02	--	--	--	--	--	--	--	--	--	--	na	1.8E+02
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	1.7E-01	7.2E-02	na	1.2E-01	--	--	--	--	--	--	--	--	1.7E-01	7.2E-02	na	1.2E-01
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	6.0E-01	--	--	--	--	--	--	--	--	--	--	na	6.0E-01

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	4.2E+03	--	--	--	--	--	--	--	--	--	--	na	4.2E+03
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	2.8E+02	--	--	--	--	--	--	--	--	--	--	na	2.8E+02
Fluorene	0	--	--	na	5.3E+03	--	--	na	1.1E+04	--	--	--	--	--	--	--	--	--	--	na	1.1E+04
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	2.0E-02	na	--	--	--	--	--	--	--	--	--	--	2.0E-02	na	--
Heptachlor [c]	0	5.2E-01	3.8E-03	na	7.9E-04	1.0E+00	7.6E-03	na	1.6E-03	--	--	--	--	--	--	--	--	1.0E+00	7.6E-03	na	1.6E-03
Heptachlor Epoxide[c]	0	5.2E-01	3.8E-03	na	3.9E-04	1.0E+00	7.6E-03	na	7.8E-04	--	--	--	--	--	--	--	--	1.0E+00	7.6E-03	na	7.8E-04
Hexachlorobenzene[c]	0	--	--	na	2.9E-03	--	--	na	5.8E-03	--	--	--	--	--	--	--	--	--	--	na	5.8E-03
Hexachlorobutadiene[c]	0	--	--	na	1.8E+02	--	--	na	3.6E+02	--	--	--	--	--	--	--	--	--	--	na	3.6E+02
Hexachlorocyclohexane Alpha-BHC[c]	0	--	--	na	4.9E-02	--	--	na	9.8E-02	--	--	--	--	--	--	--	--	--	--	na	9.8E-02
Hexachlorocyclohexane Beta-BHC[c]	0	--	--	na	1.7E-01	--	--	na	3.4E-01	--	--	--	--	--	--	--	--	--	--	na	3.4E-01
Hexachlorocyclohexane Gamma-BHC[c] (Lindane)	0	9.5E-01	na	na	1.8E+00	1.9E+00	--	na	3.6E+00	--	--	--	--	--	--	--	--	1.9E+00	--	na	3.6E+00
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	2.2E+03	--	--	--	--	--	--	--	--	--	--	na	2.2E+03
Hexachloroethane[c]	0	--	--	na	3.3E+01	--	--	na	6.6E+01	--	--	--	--	--	--	--	--	--	--	na	6.6E+01
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	4.0E+00	na	--	--	--	--	--	--	--	--	--	--	4.0E+00	na	--
Indeno (1,2,3-cd) pyrene [c]	0	--	--	na	1.8E-01	--	--	na	3.6E-01	--	--	--	--	--	--	--	--	--	--	na	3.6E-01
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Isophorone[c]	0	--	--	na	9.6E+03	--	--	na	1.9E+04	--	--	--	--	--	--	--	--	--	--	na	1.9E+04
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Lead	0	4.9E+01	5.6E+00	na	--	9.8E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	9.8E+01	1.1E+01	na	--
Malathion	0	--	1.0E-01	na	--	--	2.0E-01	na	--	--	--	--	--	--	--	--	--	--	2.0E-01	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	--	--	2.8E+00	1.5E+00	--	--	--	--	--	--	--	--	--	--	2.8E+00	1.5E+00	--	--
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	3.0E+03	--	--	--	--	--	--	--	--	--	--	na	3.0E+03
Methylene Chloride [c]	0	--	--	na	5.9E+03	--	--	na	1.2E+04	--	--	--	--	--	--	--	--	--	--	na	1.2E+04
Methoxychlor	0	--	3.0E-02	na	--	--	6.0E-02	na	--	--	--	--	--	--	--	--	--	--	6.0E-02	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Nickel	0	1.0E+02	1.1E+01	na	4.6E+03	2.0E+02	2.3E+01	na	9.2E+03	--	--	--	--	--	--	--	--	2.0E+02	2.3E+01	na	9.2E+03
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	1.4E+03	--	--	--	--	--	--	--	--	--	--	na	1.4E+03
N-Nitrosodimethylamine[c]	0	--	--	na	3.0E+01	--	--	na	6.0E+01	--	--	--	--	--	--	--	--	--	--	na	6.0E+01
N-Nitrosodiphenylamine[c]	0	--	--	na	6.0E+01	--	--	na	1.2E+02	--	--	--	--	--	--	--	--	--	--	na	1.2E+02
N-Nitrosodi-n-propylamine[c]	0	--	--	na	5.1E+00	--	--	na	1.0E+01	--	--	--	--	--	--	--	--	--	--	na	1.0E+01
Nonylphenol	0	2.8E+01	6.6E+00	--	--	5.6E+01	1.3E+01	na	--	--	--	--	--	--	--	--	--	5.6E+01	1.3E+01	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	1.3E-01	2.6E-02	na	--	--	--	--	--	--	--	--	--	1.3E-01	2.6E-02	na	--
PCB Total[c]	0	--	1.4E-02	na	6.4E-04	--	2.8E-02	na	1.3E-03	--	--	--	--	--	--	--	--	--	2.8E-02	na	1.3E-03
Pentachlorophenol [c]	0	7.7E-03	5.9E-03	na	3.0E+01	1.5E-02	1.2E-02	na	6.0E+01	--	--	--	--	--	--	--	--	1.5E-02	1.2E-02	na	6.0E+01
Phenol	0	--	--	na	8.6E+05	--	--	na	1.7E+06	--	--	--	--	--	--	--	--	--	--	na	1.7E+06
Pyrene	0	--	--	na	4.0E+03	--	--	na	8.0E+03	--	--	--	--	--	--	--	--	--	--	na	8.0E+03
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	4.0E+01	1.0E+01	na	8.4E+03	--	--	--	--	--	--	--	--	**4.0E+01**	**1.0E+01**	**na**	**8.4E+0**
Silver	0	1.0E+00	--	na	--	2.1E+00	--	na	--	--	--	--	--	--	--	--	--	**2.1E+00**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane[C]	0	--	--	na	4.0E+01	--	--	na	8.0E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.0E+0**
Tetrachloroethylene[C]	0	--	--	na	3.3E+01	--	--	na	6.6E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.6E+0**
Thallium	0	--	--	na	4.7E-01	--	--	na	9.4E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.4E-0**
Toluene	0	--	--	na	6.0E+03	--	--	na	1.2E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.2E+0**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Toxaphene [C]	0	7.3E-01	2.0E-04	na	2.8E-03	1.5E+00	4.0E-04	na	5.6E-03	--	--	--	--	--	--	--	--	**1.5E+00**	**4.0E-04**	**na**	**5.6E-0**
Tributyltin	0	4.6E-01	7.2E-02	na	--	9.2E-01	1.4E-01	na	--	--	--	--	--	--	--	--	--	**9.2E-01**	**1.4E-01**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	1.4E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+0**
1,1,2-Trichloroethane[C]	0	--	--	na	1.6E+02	--	--	na	3.2E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.2E+0**
Trichloroethylene [C]	0	--	--	na	3.0E+02	--	--	na	6.0E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.0E+0**
2,4,6-Trichlorophenol [C]	0	--	--	na	2.4E+01	--	--	na	4.8E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.8E+0**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Vinyl Chloride[C]	0	--	--	na	2.4E+01	--	--	na	4.8E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.8E+0**
Zinc	0	6.5E+01	6.6E+01	na	2.6E+04	1.3E+02	1.3E+02	na	5.2E+04	--	--	--	--	--	--	--	--	**1.3E+02**	**1.3E+02**	**na**	**5.2E+0**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	1.3E+03
Arsenic	1.8E+02
Barium	na
Cadmium	7.9E-01
Chromium III	5.0E+01
Chromium VI	1.3E+01
Copper	5.6E+00
Iron	na
Lead	6.7E+00
Manganese	na
Mercury	9.2E-01
Nickel	1.4E+01
Selenium	6.0E+00
Silver	8.4E-01
Zinc	5.2E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

9/17/2012 2:22:55 PM

Facility = Fredericksburg WWTP
Chemical = Ammonia
Chronic averaging period = 30
WLAa = 40
WLAc = 4.2
Q.L. = .2
# samples/mo. = 30
# samples/wk. = 8

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 8.47421439234851
Average Weekly limit = 5.05491198406169
Average Monthly LImit = 4.2

The data are:

9

9/17/2012 2:24:15 PM

Facility = Fredericksburg WWTP
Chemical = Ammonia (High Flow)
Chronic averaging period = 30
WLAa = 40
WLAc = 8.5
Q.L. = .2
# samples/mo. = 30
# samples/wk. = 8

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 17.1501957940386
Average Weekly limit = 10.2301790153629
Average Monthly LImit = 8.5

The data are:

9

9/17/2012 4:29:02 PM

Facility = Fredericksburg WWTP
Chemical = All Copper Data
Chronic averaging period = 4
WLAa = 14
WLAc = 9.9
Q.L. = 5
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 16
Expected Value = 5.36259
Variance = 10.3526
C.V. = 0.6
97th percentile daily values = 13.0494
97th percentile 4 day average = 8.92223
97th percentile 30 day average= 6.46758
< Q.L. = 9
Model used = BPJ Assumptions, Type 1 data

No Limit is required for this material

The data are:

0
0
0
0
0
0
0
0
10
13
12
9
5
7
2
5

9/17/2012 3:22:58 PM

Facility = Fredericksburg WWTP
Chemical = Zinc
Chronic averaging period = 4
WLAa = 130
WLAc = 130
Q.L. = 20
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 18
Expected Value = 64.0206
Variance = 251.721
C.V. = 0.247821
97th percentile daily values = 98.3594
97th percentile 4 day average = 80.1400
97th percentile 30 day average= 69.4692
< Q.L. = 0
Model used = lognormal

No Limit is required for this material

The data are:

57
55
52
50
73
45
69
70
71
62
46
70
79
64
62
38
94
93

					00610	Freshwater Ammonia Criteria (Non-trout waters)			
Watershed Code	Station ID	Collection Date & Time	Temperature (Celcius)	pH	Nitrogen, Ammonia,	Acute Criteria	Exceedance?	Chronic* Criteria	Exceedance?
					Value	(mg/L as N)	(Y/N)	(mg/L as N)	(Y/N)
VAN-E20E	3-RPP104.47	01/12/2005 09:45	6.83	7.14	0.05	31.54	N	5.56	N
		03/24/2005 14:10	9.15	7.17	0.13	30.54	N	5.48	N
		05/12/2005 11:30	22.56	8.71	0.16	2.16	N	0.46	N
		07/07/2005 12:25	28.4	7.17	0.1	30.54	N	2.24	N
		09/06/2005 12:50	26.4	7.3	0.08	26.21	N	2.36	N
		11/01/2005 13:22	11.7	7.38	0.04	23.61	N	4.80	N
		01/04/2006 13:10	5.4	7.38	0.04	23.61	N	4.80	N
		03/08/2006 13:05	8.1	7.7	0.04	14.44	N	3.58	N
		04/05/2006 13:22	15.2	7.3	0.16	26.21	N	4.86	N
		06/20/2006 13:00	27.7	6.9	0.23	39.16	N	2.62	N
		08/09/2006 12:45	30.3	7.1	0.1	32.86	N	2.05	N
		10/11/2006 13:13	16.9	7.2	0.04	29.54	N	4.62	N
		12/12/2006 13:15	3.3	7.3	0.19	26.21	N	5.08	N
		04/11/2007 12:35	10.7	7.9	0.08	10.13	N	2.80	N
		06/06/2007 12:22	26.2	7.1	0.08	32.86	N	2.67	N
		08/08/2007 11:30	30	7	0.32	36.09	N	2.18	N
		10/10/2007 12:15	24.7	6.9	0.04	39.16	N	3.17	N
		12/11/2007 12:15	5.3	7	0.04	36.09	N	5.91	N
	3-RPP106.01	04/08/2008 13:15	10.8	7.1	0.07	32.86	N	5.67	N
		05/15/2008 12:55	16.1	7	0.04	36.09	N	5.34	N
		06/10/2008 12:25	29.5	7.1	0.04	32.86	N	2.16	N
		07/08/2008 12:22	27	7.5	0.04	19.89	N	1.95	N
		08/12/2008 12:20	26.2	7.7	0.04	14.44	N	1.69	N
		09/09/2008 12:00	24.6	7	0.06	36.09	N	3.09	N
		10/15/2008 11:58	19.8	7.5	0.04	19.89	N	3.10	N
		11/06/2008 12:15	13.5	7.1	0.04	32.86	N	5.67	N
		12/18/2008 13:00	6.7	7	0.04	36.09	N	5.91	N
		01/13/2009 12:35	2.6	7	0.04	36.09	N	5.91	N
		02/10/2009 12:15	5	7.1	0.04	32.86	N	5.67	N
		03/10/2009 12:44	13.4	7.7	0.04	14.44	N	3.58	N

Attachment 11

					00610	Freshwater Ammonia Criteria (Non-trout waters)			
Watershed Code	Station ID	Collection Date & Time	Temperature (Celcius)	pH	Nitrogen, Ammonia,	Acute Criteria	Exceedance?	Chronic* Criteria	Exceedance?
					Value	(mg/L as N)	(Y/N)	(mg/L as N)	(Y/N)
		04/16/2009 12:45	10.9	7.2	0.04	29.54	N	5.39	N
		05/12/2009 13:00	17.6	7.3	0.04	26.21	N	4.16	N
		06/16/2009 12:45	24.5	7.3	0.04	26.21	N	2.67	N
		07/14/2009 12:05	27.4	7.2	0.06	29.54	N	2.35	N
		08/11/2009 12:15	-	-	0.06	N/A	N/A	N/A	N/A
		09/09/2009 12:27	24.6	7.2	0.07	29.54	N	2.81	N
		10/20/2009 13:11	10.9	7.3	0.04	26.21	N	5.08	N
		11/05/2009 13:00	11.5	7.2	0.02	29.54	N	5.39	N
		12/03/2009 13:15	9.2	7.4	0.02	22.97	N	4.73	N
	3-RPP107.91	01/12/2005 10:05	6.43	7.21	0.04	29.21	N	5.36	N
		03/24/2005 14:50	9.01	7.68	0.15	14.94	N	3.66	N
		05/12/2005 11:50	21.34	7.48	0.04	20.49	N	2.86	N
		07/07/2005 12:45	28.5	7.38	0.06	23.61	N	1.95	N
		09/06/2005 13:15	26.24	7.53	0.07	19.01	N	2.00	N
		11/01/2005 13:48	11	7.42	0.04	22.34	N	4.66	N
		01/04/2006 13:30	5.42	7.38	0.04	23.61	N	4.80	N
		03/08/2006 13:33	6.1	7.7	0.04	14.44	N	3.58	N
		04/05/2006 13:44	14.1	7.4	0.07	22.97	N	4.73	N
		06/20/2006 13:20	29.5	7.2	0.21	29.54	N	2.05	N
		08/09/2006 13:10	30.2	7.9	0.04	10.13	N	1.02	N
		10/11/2006 13:35	16.8	7.2	0.04	29.54	N	4.65	N
		12/12/2006 13:38	2.7	7.3	0.04	26.21	N	5.08	N
		04/11/2007 12:55	9.3	7.3	0.25	26.21	N	5.08	N
		06/06/2007 12:40	24.3	7	0.06	36.09	N	3.15	N
		08/08/2007 11:50	30.5	7.1	0.38	32.86	N	2.02	N
		10/10/2007 12:33	25.3	7	0.07	36.09	N	2.95	N
		12/11/2007 12:30	6.9	7.2	0.04	29.54	N	5.39	N
	3-RPP110.57	12/19/2006 15:15	8.2	7.8	0.04	12.14	N	3.18	N
		02/27/2007 16:10	5	7.1	0.04	32.86	N	5.67	N
		04/25/2007 14:10	21.3	8.3	0.04	4.71	N	0.98	N

					00610	Freshwater Ammonia Criteria (Non-trout waters)			
Watershed Code	Station ID	Collection Date & Time	Temperature (Celcius)	pH	Nitrogen, Ammonia,	Acute Criteria	Exceedance?	Chronic* Criteria	Exceedance?
					Value	(mg/L as N)	(Y/N)	(mg/L as N)	(Y/N)
		06/27/2007 14:00	31.2	8.7	0.04	2.20	N	0.27	N
		08/22/2007 14:00	23.9	8	0.04	8.41	N	1.33	N
Comment Codes									
QQ	Analyte detected above the MDL but below the method quantification limit.								
U	Material analyzed for, but not detected. Value stored is the limit of detection for the process in use.								

Public Notice – Environmental Permit

PURPOSE OF NOTICE: To seek public comment on a draft permit from the Department of Environmental Quality that will allow the release of treated wastewater into a water body in Fredericksburg, Virginia and a modified program proposal submitted to the Department of Environmental Quality to control industrial wastewater before it enters the sanitary sewer system in Fredericksburg, Virginia.

PUBLIC COMMENT PERIOD: January 25, 2013 to February 25, 2013

PERMIT/PROGRAM NAME: Virginia Pollutant Discharge Elimination System Permit – Wastewater issued by DEQ, under the authority of the State Water Control Board and a Publicly Owned Treatment Works Pretreatment Program.

APPLICANT NAME, ADDRESS AND PERMIT NUMBER: City of Fredericksburg, P.O. Box 7447, Fredericksburg, Virginia 22404, Permit No. VA0025127

NAME AND ADDRESS OF FACILITY: Fredericksburg WWTF, Route #700 Beulah Salisbury Road, Fredericksburg, VA 22401

PROJECT DESCRIPTION: The City of Fredericksburg has applied for a reissuance of a permit for the Public Fredericksburg WWTF. The applicant proposes to release treated sewage wastewaters from residential, commercial, and industrial areas at a rate of 4.5 million gallons per day into a water body. Sludge from the treatment process will be land applied by a contractor. The facility proposes to release the treated sewage into the Rappahannock River in the Rappahannock River Watershed. A watershed is the land area drained by a river and its incoming streams. The permit will limit the following pollutants to amounts that protect water quality: pH, Carbonaceous Biochemical Oxygen Demand-5 day ($cBOD_5$), Total Suspended Solids (TSS), Total Kjeldahl Nitrogen (TKN), Total Phosphorus, *E. coli* bacteria, Dissolved Oxygen, and Total Recoverable Zinc. Monitoring for Total Recoverable Copper is present.

This facility is subject to the requirements of 9 VAC 25-820 and has registered for coverage under the General VPDES Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Watershed in Virginia.

The City of Fredericksburg has also requested approval from DEQ of a modification to the pretreatment program for industrial dischargers. Industrial participants in this program must reduce contaminants in wastewater before releasing it to the sanitary sewer system. The modification includes changes to the existing sewer use ordinance. The request for modification to the pretreatment program will be approved if no comments are received within the specified comment period listed above.

HOW TO COMMENT AND/OR REQUEST A PUBLIC HEARING: DEQ accepts comments and requests for public hearing by hand-delivery, e-mail, fax or postal mail. All comments and requests must be in writing and be received by DEQ during the comment period. Submittals must include the names, mailing addresses and telephone numbers of the commenter/requester and of all persons represented by the commenter/requester. A request for public hearing must also include: 1) The reason why a public hearing is requested. 2) A brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requestor, including how and to what extent such interest would be directly and adversely affected by the permit. 3) Specific references, where possible, to terms and conditions of the permit with suggested revisions. DEQ may hold a public hearing, including another comment period, if public response is significant and there are substantial, disputed issues relevant to the permit.

CONTACT FOR PUBLIC COMMENTS, DOCUMENT REQUESTS AND ADDITIONAL INFORMATION: The public may review the documents at the DEQ-Northern Regional Office by appointment, or may request electronic copies of the draft permit and fact sheet.
Name: Anna T. Westernik
Address: DEQ-Northern Regional Office, 13901 Crown Court, Woodbridge, VA 22193
Phone: (703) 583-3837 E-mail: anna.westernik@deq.virginia.gov Fax: (703) 583-3821

Attachment 12

APPENDIX A
SCHEDULE OF COMPLIANCE

The City of Fredericksburg agrees to:

1. By no later than December 1, 2006, complete repairs to the Primary Clarifier #1 and place back in service.

2. By no later than December 1, 2006, submit revisions to Operations and Maintenance (O&M) manual, for review and approval, that incorporates all ten items found in Attachment C of the Fredericksburg WWTF Preliminary Process Assessment and Recommendations and the manual use of the chlorination/dechlorination system.

3. By no later than December 1, 2006, initiate the plant performance testing program pursuant to the O&M Manual Section 5.5.1, testing for the specified parameters shall include, but not be limited to: (1) raw influent; (2) pretreatment units; (3) primary clarifier; (4) primary sludge; (5) oxidation ditch; (6) secondary clarifiers; (7) return and waste activated sludge; (8) anaerobic digester; and (9) digested sludge. Beginning January 1, 2007, submit all plant performance testing data to DEQ with the monthly Discharge Monitoring Report submission.

4. By no later than January 15, 2007, complete repairs to the Belt Filter Press #1 and place back in service.

APPENDIX A

The City shall:

1. Submit to DEQ for review and approval by February 1, 2008, an assessment of the WWTF, including the condition of and needed repairs of all mechanical equipment, all process units and plant infrastructure. The assessment shall be completed by a licensed engineer, shall include recommendations and a schedule for the repairs or upgrades that need to be made to the WWTF, and identify where the current O&M Manual may need to be revised to accommodate such recommendations to ensure consistent compliance with the City's Permit. Upon approval by DEQ, the repair and upgrade recommendations and schedule shall become an enforceable part of this Order.

2. Submit to DEQ for review and approval by February 1, 2008, a Preliminary Engineering Report (PER) that evaluates the options of either refurbishing the primary clarifiers and digesters or proposes an alternative solids treatment method. The City shall submit plans and specifications to DEQ for the approved option within 30 days of DEQ approval of the PER. Within 15 days of DEQ approval of the plans and specifications, the City shall submit a plan and schedule of implementation for the approved option that shall become enforceable under the Order.

3. Prepare and submit to DEQ for review and approval by November 1, 2007 a plan and schedule of implementation specifically addressing how the City plans to meet Reliability Class I requirements. As of the date of the City's execution of this Order, DEQ is aware of only one Class I requirement, i.e. WWTF influent pumps that needs to be addressed to ensure continued compliance with Reliability Class requirements, therefore, DEQ anticipates that on November 1, 2007, the City will prepare and submit a plan for the repair and upkeep of said pumps. Upon approval by DEQ, the plan and schedule shall become an enforceable part of this Order. If at the time of approval, DEQ notes other reliability class requirements that are not being met, DEQ will notify the City and the City will submit an amended plan within 30 days of notification.

4. Calculate a mass balance for solids in the WWTF on a monthly basis beginning November 1, 2007 and continuing for the life of this Order. The mass balance calculations shall be due by the 10th of each month and shall be submitted with the monthly DMR. After three months of calculations, the City shall perform an evaluation of the data to ensure that the difference between the quantity of solids entering the facility and exiting the facility is not greater than 15% and that accumulation of solids in the WWTF is not adversely affecting effluent quality or causing violations of effluent limits. The evaluation shall be submitted to DEQ, for review and approval, with DMR due April 10, 2008. If upon review, DEQ determines that the evaluation supports a finding of solids accumulation and potential adverse effects on effluent quality, the City shall submit to DEQ for review and approval a plan and schedule detailing steps that the City will take to alleviate the solids accumulation. The plan and schedule shall be due within

30 days of notification by DEQ that it has reached this conclusion. Upon approval said plan and schedule shall become a part of and enforceable under the terms of this order.

5. Beginning on November 10, 2007, provide a monthly report on the WWTP's belt filter press and lime stabilization operations, including a description of any significant maintenance issues related to the press and solids stabilization operations. Included in this report shall be data regarding pH and detention time and the amount of sludge processed and hauled offsite from the facility. Said report shall be submitted concurrently with the monthly DMR.

6. Develop by October 15, 2007, a procedure that documents when facility employees contact Spotsylvania County for plant assistance, including why the contact was made and what the outcome was. Said document shall be stored at the facility and available for review upon request by DEQ staff.

7. Prepare and submit to DEQ, for review and comment by December 1, 2007, a report that describes the Infiltration and Inflow (I&I) Program administered by the City. This report shall include at a minimum: (1) a description of all methods of I&I detection, evaluations and analysis used by the City; (2) a schedule on which said methods of detection, evaluation and analysis have been or will be performed in order to eliminate or reduce I&I within the City's sanitary sewer collection system; (3) the number of dedicated staff for I&I reduction and elimination activities, their duties and their management structure; and (4) budget information for I&I evaluation and reduction/elimination activities for the past five years. Additionally, the report shall include description of contemplated future I&I Program activities within the City's sanitary sewer collection system for the next three years. This report is for informational purposes only and the City reserves the right to adjust its I&I program within its discretion.

APPENDIX A
SCHEDULE OF COMPLIANCE

City of Fredericksburg shall:

1. Within 30 days of execution of this Order, submit to DEQ the Facility's spare parts inventory as set forth in the Facility's O&M Manual for the maintenance of the oxidation ditch, including a set of specialized pillow block bearings compatible with the oxidation ditch drive shaft.

2. Within 30 days of execution of this Order, submit to DEQ for review and comment, a revised Fats, Oils and Grease (FOG) Plan which reflects the existing operations within the Publically Owned Treatment Works (POTW) as defined under 9 VAC 25-31-10.

Unless otherwise specified in this Order, City of Fredericksburg shall submit all requirements of Appendix A of this Order to:

Virginia Department of Environmental Quality
Attn: Enforcement Staff
13901 Crown Court
Woodbridge, VA 22193

Revised 2/2003

State "Transmittal Checklist" to Assist in Targeting
Municipal and Industrial Individual NPDES Draft Permits for Review

Part I. State Draft Permit Submission Checklist

In accordance with the MOA established between the Commonwealth of Virginia and the United States Environmental Protection Agency, Region III, the Commonwealth submits the following draft National Pollutant Discharge Elimination System (NPDES) permit for Agency review and concurrence.

Facility Name:	Fredericksburg WWTP
NPDES Permit Number:	VA0025127
Permit Writer Name:	Anna T. Westernik
Date:	October 11, 2012

Major [X] **Minor [ ]** **Industrial [ ]** **Municipal [X]**

I.A. Draft Permit Package Submittal Includes:	**Yes**	**No**	**N/A**
1. Permit Application?	X		
2. Complete Draft Permit (for renewal or first time permit – entire permit, including boilerplate information)?	X		
3. Copy of Public Notice?	X		
4. Complete Fact Sheet?	X		
5. A Priority Pollutant Screening to determine parameters of concern?	X		
6. A Reasonable Potential analysis showing calculated WQBELs?	X		
7. Dissolved Oxygen calculations?	X		
8. Whole Effluent Toxicity Test summary and analysis?	X		
9. Permit Rating Sheet for new or modified industrial facilities?			X

I.B. Permit/Facility Characteristics	**Yes**	**No**	**N/A**
1. Is this a new, or currently unpermitted facility?		X	
2. Are all permissible outfalls (including combined sewer overflow points, non-process water and storm water) from the facility properly identified and authorized in the permit?	X		
3. Does the fact sheet **or** permit contain a description of the wastewater treatment process?	X		
4. Does the review of PCS/DMR data for at least the last 3 years indicate significant non-compliance with the existing permit?		X	
5. Has there been any change in streamflow characteristics since the last permit was developed?		X	
6. Does the permit allow the discharge of new or increased loadings of any pollutants?		X	
7. Does the fact sheet **or** permit provide a description of the receiving water body(s) to which the facility discharges, including information on low/critical flow conditions and designated/existing uses?	X		
8. Does the facility discharge to a 303(d) listed water?	X		
a. Has a TMDL been developed and approved by EPA for the impaired water?	X		
b. Does the record indicate that the TMDL development is on the State priority list and will most likely be developed within the life of the permit?	X		
c. Does the facility discharge a pollutant of concern identified in the TMDL or 303(d) listed water?	X		
9. Have any limits been removed, or are any limits less stringent, than those in the current permit?		X	
10. Does the permit authorize discharges of storm water?		X	

Attachment 14

I.B. Permit/Facility Characteristics – cont.	Yes	No	N/A
11. Has the facility substantially enlarged or altered its operation or substantially increased its flow or production?		X	
12. Are there any production-based, technology-based effluent limits in the permit?		X	
13. Do any water quality-based effluent limit calculations differ from the State's standard policies or procedures?		X	
14. Are any WQBELs based on an interpretation of narrative criteria?		X	
15. Does the permit incorporate any variances or other exceptions to the State's standards or regulations?		X	
16. Does the permit contain a compliance schedule for any limit or condition?		X	
17. Is there a potential impact to endangered/threatened species or their habitat by the facility's discharge(s)?	X		
18. Have impacts from the discharge(s) at downstream potable water supplies been evaluated?	X		
19. Is there any indication that there is significant public interest in the permit action proposed for this facility?		X	
20. Have previous permit, application, and fact sheet been examined?	X		

Part II. NPDES Draft Permit Checklist

Region III NPDES Permit Quality Checklist – for POTWs
(To be completed and included in the record only for POTWs)

II.A. Permit Cover Page/Administration	Yes	No	N/A
1. Does the fact sheet or permit describe the physical location of the facility, including latitude and longitude (not necessarily on permit cover page)?	X		
2. Does the permit contain specific authorization-to-discharge information (from where to where, by whom)?	X		

II.B. Effluent Limits – General Elements	Yes	No	N/A
1. Does the fact sheet describe the basis of final limits in the permit (e.g., that a comparison of technology and water quality-based limits was performed, and the most stringent limit selected)?	X		
2. Does the fact sheet discuss whether "antibacksliding" provisions were met for any limits that are less stringent than those in the previous NPDES permit?	X		

II.C. Technology-Based Effluent Limits (POTWs)	Yes	No	N/A
1. Does the permit contain numeric limits for ALL of the following: BOD (or alternative, e.g., CBOD, COD, TOC), TSS, and pH?	X		
2. Does the permit require at least 85% removal for BOD (or BOD alternative) and TSS (or 65% for equivalent to secondary) consistent with 40 CFR Part 133?	X		
a. If no, does the record indicate that application of WQBELs, or some other means, results in more stringent requirements than 85% removal or that an exception consistent with 40 CFR 133.103 has been approved?			X
3. Are technology-based permit limits expressed in the appropriate units of measure (e.g., concentration, mass, SU)?	X		
4. Are permit limits for BOD and TSS expressed in terms of both long term (e.g., average monthly) and short term (e.g., average weekly) limits?	X		
5. Are any concentration limitations in the permit less stringent than the secondary treatment requirements (30 mg/l BOD5 and TSS for a 30-day average and 45 mg/l BOD5 and TSS for a 7-day average)?		X	
a. If yes, does the record provide a justification (e.g., waste stabilization pond, trickling filter, etc.) for the alternate limitations?			X

II.D. Water Quality-Based Effluent Limits	Yes	No	N/A
1. Does the permit include appropriate limitations consistent with 40 CFR 122.44(d) covering State narrative and numeric criteria for water quality?	X		
2. Does the fact sheet indicate that any WQBELs were derived from a completed and EPA approved TMDL?		X	
3. Does the fact sheet provide effluent characteristics for each outfall?	X		
4. Does the fact sheet document that a "reasonable potential" evaluation was performed?	X		
a. If yes, does the fact sheet indicate that the "reasonable potential" evaluation was performed in accordance with the State's approved procedures?	X		
b. Does the fact sheet describe the basis for allowing or disallowing in-stream dilution or a mixing zone?	X		
c. Does the fact sheet present WLA calculation procedures for all pollutants that were found to have "reasonable potential"?	X		
d. Does the fact sheet indicate that the "reasonable potential" and WLA calculations accounted for contributions from upstream sources (i.e., do calculations include ambient/background concentrations)?		X	
e. Does the permit contain numeric effluent limits for all pollutants for which "reasonable potential" was determined?	X		

II.D. Water Quality-Based Effluent Limits – cont.	Yes	No	N/A
5. Are all final WQBELs in the permit consistent with the justification and/or documentation provided in the fact sheet?	X		
6. For all final WQBELs, are BOTH long-term AND short-term effluent limits established?	X		
7. Are WQBELs expressed in the permit using appropriate units of measure (e.g., mass, concentration)?	X		
8. Does the record indicate that an "antidegradation" review was performed in accordance with the State's approved antidegradation policy?	X		

II.E. Monitoring and Reporting Requirements	Yes	No	N/A
1. Does the permit require at least annual monitoring for all limited parameters and other monitoring as required by State and Federal regulations?	X		
a. If no, does the fact sheet indicate that the facility applied for and was granted a monitoring waiver, AND, does the permit specifically incorporate this waiver?			
2. Does the permit identify the physical location where monitoring is to be performed for each outfall?	X		
3. Does the permit require at least annual influent monitoring for BOD (or BOD alternative) and TSS to assess compliance with applicable percent removal requirements?		X	
4. Does the permit require testing for Whole Effluent Toxicity?	X		

II.F. Special Conditions	Yes	No	N/A
1. Does the permit include appropriate biosolids use/disposal requirements?	X		
2. Does the permit include appropriate storm water program requirements?		X	

II.F. Special Conditions – cont.	Yes	No	N/A
3. If the permit contains compliance schedule(s), are they consistent with statutory and regulatory deadlines and requirements?			X
4. Are other special conditions (e.g., ambient sampling, mixing studies, TIE/TRE, BMPs, special studies) consistent with CWA and NPDES regulations?	X		
5. Does the permit allow/authorize discharge of sanitary sewage from points other than the POTW outfall(s) or CSO outfalls [i.e., Sanitary Sewer Overflows (SSOs) or treatment plant bypasses]?		X	
6. Does the permit authorize discharges from Combined Sewer Overflows (CSOs)?		X	
a. Does the permit require implementation of the "Nine Minimum Controls"?			X
b. Does the permit require development and implementation of a "Long Term Control Plan"?			X
c. Does the permit require monitoring and reporting for CSO events?			X
7. Does the permit include appropriate Pretreatment Program requirements?	X		

II.G. Standard Conditions	Yes	No	N/A
1. Does the **permit** contain all 40 CFR 122.41 standard conditions or the State equivalent (or more stringent) conditions?	X		

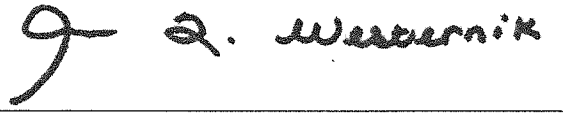
List of Standard Conditions – 40 CFR 122.41

Duty to comply	Property rights	Reporting Requirements
Duty to reapply	Duty to provide information	Planned change
Need to halt or reduce activity not a defense	Inspections and entry	Anticipated noncompliance
	Monitoring and records	Transfers
Duty to mitigate	Signatory requirement	Monitoring reports
Proper O & M	Bypass	Compliance schedules
Permit actions	Upset	24-Hour reporting
		Other non-compliance

2. Does the permit contain the additional standard condition (or the State equivalent or more stringent conditions) for POTWs regarding notification of new introduction of pollutants and new industrial users [40 CFR 122.42(b)]?	X		

Part III. Signature Page

Based on a review of the data and other information submitted by the permit applicant, and the draft permit and other administrative records generated by the Department/Division and/or made available to the Department/Division, the information provided on this checklist is accurate and complete, to the best of my knowledge.

Name	Anna T. Westernik
Title	Environmental Specialist II
Signature	
Date	October 11, 2012